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Notes of the Month

ADVANCES IN JUTE RESEARCH

NEW lines of advance in jute research were reported at the annual meeting of the British Jute Trade Research Association. Dr. H. P. Stout, director of research, said, "Success in applying science to this long-established textile industry is well shown by the change in outlook. When one walks round your mills and factories it is evident the technology of jute processing is well understood, for the industry is now running at a high level of technical efficiency. In this situation our thoughts turn increasingly to the future and to the directions in which our work must now advance."

Dr. Stout said that they would be engaged on a thorough study of the technical problems arising in the utilisation of fibre of all types. This involved a deeper study of the textile functions of machinery, and the manner in which improvements could be made. The search for new outlets for jute products would also take its place as a major part of their programme. To press it to the full required knowledge of the technicalities of industries using jute in novel ways. Dr. Stout said that to bring these lines of work to fruition required a considerable technical effort on the part of the Research Association. It also meant close co-operation with the industry, textile machinery-makers, sales representatives, and the suppliers of raw material.

Mr. R. W. R. Kennedy, chairman, announced that they had asked Dr. Stout to undertake a visit to Pakistan, Burma and Siam early in 1962. He stated "The objects of his visit are to meet the scientific and technical people concerned with jute and allied fibre production, and to learn their problems at first-hand; to see what scientific development work is projected; and to consider whether it is possible for our association to offer any scientific assistance which might help fibre scientists overseas in their work."

BRITISH ENKA LTD.

COURTAULDS have decided to continue textile yarn production, yarn processing and tyre fabric manufacture at British Enka's factories at Aintree and Bolton, but to start closing down tyre yarn production at the end of next February. The cellulose film unit will cease production at once. After February 1962, Aintree tyre yarn production will be redeployed at Courtaulds other tyre yarn factories in the U.K. at Preston, Wolverhampton and Carrickfergus. All three, it is reported, have been re-equipped with the latest machinery to produce the higher strength "Tyrex" yarns for which there is increasing demand from tyre manufacturers. Preston is one of the largest rayon tyre yarn factories in the world.

Nearly 1,000 employees will be affected by the ending of tyre yarn operations. The immediate closing of the film unit will affect about 90 people. It will also be necessary to continue the reduction of research and administrative staffs wherever there is duplication with Courtaulds. Employees and the local trade union representatives have already been informed of these decisions. The management will be discussing with them how to put the changes into effect with the least dislocation and hardship to those concerned.

LOW COST AUTOMATION

"SENIOR managers must be convinced of the value and applicability of low cost automation to their firms for success to be achieved. The small manufacturer often argues that he has at least one or more of the following disadvantages: short production runs, old equipment, crowded inadequate buildings, limited capital and no specialist personnel. But sometimes he does not realise that he has some advantage over the large manufacturer such as less rigid product designs, no costly special-purpose equipment, faster and less expensive changeover. Indeed, he has one great advantage—flexibility." This was said by Mr. Landon Goodman (industrial specialist, Electrical Development Association), when addressing a recent meeting of Kingston Area Productivity Association.

There was, said Mr. Goodman, wide scope for low cost automation in most types of industries particularly where large numbers of manual operations were undertaken. A feature of low cost automation was the use of simple types of equipment which could be employed again and again; a few examples were: air cylinders, solenoids, valves, timers and photo-electric cells. Most applications involved the addition of these simple "building blocks" to existing plant and machinery, such as machine tools, guillotines, bending machines and mixers. Other applications sometimes required no more than the building of a simple frame or the use of an indexing unit on which the building blocks were mounted. Because of this inherent versatility low cost automation could be well and profitably applied to batch production. The construction of the equipment was usually well within the ability of a competent maintenance department.

Many types of standard equipment could be employed ranging from slotted angle to indexing tables. Electrical hydraulic and pneumatic power systems might be utilised. Electricity provided rotary motive power, simple infinitely variable speed drives, and control systems and timers, various electronic devices, e.g. photo-electric cells and sensing probes. Electro-heat offered many advantages for processing, for by this method heat could be quickly, accurately and easily applied with no risk of contamination.

Compressed air was most useful for lifting, pushing and clamping. There was a wide range of single- and double-acting cylinders on the market and many types of valves such as pilot and sequence. In most cases the simplest and

most flexible way of designing and building up a control system for a pneumatic installation was to use solenoid-operated pilot valves using an electrical system.

A system had been developed which could be used to operate automatically a standard capstan lathe. It consisted of a series of air cylinders which were used to carry out the various manual movements usually performed by the operator. Each machine movement was initiated electrically and the sequence was pre-determined by positioning plugs in a programme control panel. In this way automatic small batch production could be economically obtained.

The drilling of small component parts was often carried out with the simplest tools and relatively elementary jigging equipment. Production rates could be materially increased by multiple drilling and the use of manually indexed, multi-station jigs, even on short runs of only moderate lengths. There were various types of small standardised heads available which could be fitted to any existing standard drilling machine provided that there was sufficient room between the spindle nose of the machine and the table. In one design two sizes of drill head were available, with six or eight spindles. Simple adjustment of the spindle positions minimised the change-over time between batches and within the centre-distance range of the head there was no restriction on the whole pattern. Any number of the spindles could be used as required, and in addition, to drilling, tapping, reaming and counter-sinking could be undertaken.

Finally, said Mr. Landon Goodman, "The sooner a Department of Automation is established in this country, the better. Industrial experience has always shown that unless somebody is given the responsibility for the development of a science or technology, progress very nearly marks time." Such a department would be organised on a national basis, representative of trade unions, management and the Government, to deal with the problems that automation might bring to industry and to speed up its introduction. The department would act as an intelligence and information centre. "By obtaining and publishing concrete and unbiased knowledge," it would do much to dispel fears, often justifiable, that are engendered today by lack of experience and ignorance.

MAN-MADE FIBRE INDUSTRY

ADDRESSING the recent annual meeting of the British Man-made Fibres Federation, Sir William Palmer (chairman), took an optimistic view of the future of the industry, stating that there seemed no ground for a gloomy one. Having described in brief the economic position of the country, he went on to comment, "Our own industry could not expect to remain free from these influences and its recent experience is very like that of the country as a whole. The simplest guide to its conditions and certainly the easiest to ascertain is the production of filament yarn and staple." This reached a very high level about the end of last year and had fluctuated since then below its highest level, but above levels of the previous years. Most other sections of the industry seemed to have had a similar experience. One of the largest outlets, clothing, continued to expand. Consumers' expenditure on clothing had been rising fast for some time; in 1960 it was about 33% above the level of 1955, and for each month during 1961 further increases had been recorded.

Constant improvement of the older man-made fibres and the continued development of a number of newer fibres of remarkable properties gave strong ground for expecting that the man-made fibres would hold their own against others, continued Sir William. Competition within the industry between different fibres was likely to become keener. At present the two older fibres, viscose and acetate, fully kept their place, the development of triacetate having made great strides.

WOOL AND MAN-MADE FIBRES

ACCORDING to "Wool Intelligence" consumption of raw wool in the main wool textile producing countries of the non-Communist world fell by about 9% in the third quarter of 1961 compared with the second. The daily rate of consumption, however, was almost unchanged after making allowance for the effect of annual holidays. Consumption was lower in almost all reporting countries, notably France and the U.K. Compared with the third quarter of 1960 there was an overall increase of 1% but consumption was lower in many countries including the U.S., Italy, Belgium, Australia, Netherlands and Sweden.

Matching the fall in consumption, production in all sectors—tops, yarns and fabrics—was lower in the third quarter than in the second, the reductions being of the order of 10, 7 and 2%, respectively. In each case, however, the overall figures were higher than those of the third quarter of 1960. In the 9 months January to September, 1961 consumption of raw wool was 2½% lower than the corresponding period of 1960 and the output of yarn was 2% down. Production of tops and fabrics, however, was 1% up. (N.B.—Production of fabrics in January-September, 1961 amounted to 1,518·7 million square yards, or 1% more than in January-September, 1960.) Stocks of both raw wool and wool tops were lower at the end of September than at the end of June, stocks of raw wool in the United Kingdom showing a particularly marked decline.

World production figures of rayon and the noncellulosic man-made fibres. show that despite the incidence of summer holidays, rayon output rose by a further 2% between the second and third quarters and the total was about 5% more than in the third quarter of last year. The increase compared with the second quarter of 1961 was confined to rayon staple, output of which rose by 4%. In the field of non-cellulosic man-made fibres world output of nylon, "Terylene," "Orlon" and similar fibres rose to some 1,560 million lb. in 1960. This represented an increase of 23% on 1959. Production of nylon, quantitatively the most important of these fibres, rose by 18% to 876 million lb. and those of acrylic ("Courtelle," "Orlon," "Acrilan," etc.) and polyester ("Terylene," "Dacron," etc.) fibres showed advances of 24 and 43% to 285 and 251 million lb., respectively.

The "Textile Manufacturer"

Wishes Everyone a Happy Christmas

with Steady Progress

in the Coming Year

Production of Fancy Yarns During Twisting

Structure and special functions of core, effect and binder threads also the character and applications of different top rollers, yarn tensioning methods, oscillating yarn guides for bars, types of machines and conversion techniques

By N. PRIMENTAS

TWISTING is unquestionably the most versatile process for making the widest range of fancy yarns in exquisite styles and shades. Considering the scope offered by existing materials, blends, counts, colour selection, etc., and the extremely important factors of twist and methods of joining the component yarns, one can readily visualise the limitless possibilities available. Never before have fabric designers had such a wealth of colour and novelty to inspire them in the ceaseless search for new and better constructions.

Many fancy yarns are produced on a commission basis and the fabric designer should give precise information to the fancy yarn doubler if he expects to obtain the best effects in a cloth. It is hardly necessary to note that in many cases the fancy yarn is made in the appropriate style and colour to suit the design of the fabric. Sometimes, however, an accumulated stock of fancy yarns must be used up and the appropriate fabric structure must then be found to harmonise with and make the most of the yarn on hand.

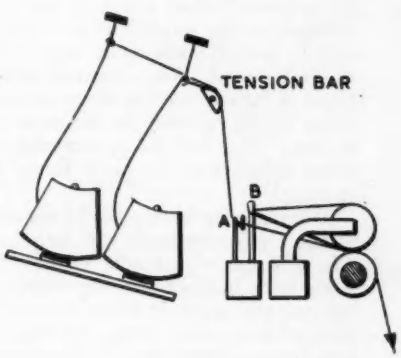
The examination of yarn for its suitability is done *after* it has been made into a fabric. This is well known to those engaged in the manufacture of novelty fabrics hence yarns on bobbins, hanks or sample cards are more useful to fancy yarn doubler's reference than for other purposes. The reason for this is that the character of the yarn is considerably modified when it is made into a cloth due to interlacing with itself or with other yarns in weaving or due to the loop inter-meshing in knitting.

A fancy twist yarn may consist of two or more threads delivered at different speeds or of various counts and twisted together to produce a novelty effect.

Close examination will usually reveal that each one of the constituent threads plays an important role in the construction of a fancy yarn. Thus one component may occupy a central position around which a yarn is wrapped to create the main effect and these two yarns may also be twisted with another so that either the effect is fixed in position or certain structural characteristics are developed. According to their structure and function these components receive a special designation i.e., core, effect and binder. (See Fig. 25.)

Fig. 25. (left). Enlarged sketch showing the three component yarns (a) effect (b) binder and (c) core and their relative positions

Fig. 26. (below). Double nip threading. Yarn from the supply package passes over tension bars, through guide A and roller nip, upward to encircle the top roller, around peg B, through the rollers again and down to the bobbin



Core Yarns

A core yarn is sometimes referred to as a base, ground or foundation thread, in the yarn or yarns on which the effect thread, delivered at a faster rate, is coiled in a manner suitable for the particular yarn and end-use. Apart from its colour—which provides valuable shade and tone effects—the core is generally fine and strong. A fine core thread is required for discontinuous effect fancy yarn intended for fine fabrics, in which the thin portion of the yarns has to be very similar to the thickness of the ground threads. This allows the thick portions, such as knops and slubs to become very prominent decorative elements in the fabric. However, yarns employing thick cores are often used, one good example being those knop yarns which have a single woollen core and fine, usually bright coloured effect threads.

The strength of the core thread is extremely important for at least two reasons:—

(1) The core should be strong enough to withstand the tension or drag developed during twisting. Often a heavy traveller has to be used—depending on the resultant count of the fancy yarn—to keep the yarn balloon within reasonable limits. Needless to say the

effect yarn does not contribute to the strength of the fancy yarn.

(2) The strength of the core carries the yarn through the subsequent winding and weaving processes.

A point worthy of mention is that the core is usually of two-fold yarn or, preferably, two single yarns which, during fancy twisting, will form a folded core. The disadvantages of employing a single core include the possibility of either substantially increasing the twist in the yarn ("twist-on-twist") rendering it lively with crêpe yarn characteristics, or, to reduce seriously its strength (twisting twist reverse to the spinning twist). Despite the weaknesses cited use is made sometimes of single core yarns which are twisted during fancy twisting operation opposite to the spinning twist; a suitable twist is selected so that in the finished yarn the core has reverse directions of twist to what it had originally. This method is mainly confined to woollen core yarns.

Effect and Binder Threads

These are the threads or rovings employed to create the various designs and textural characteristics in fancy yarns. Often named according to the effect produced they are known as gimping (the yarn responsible for the gimp formation), snarling, knopping, etc., yarns. The term "excess" is a name given to it by some manufacturers and this is perhaps more descriptive, for in certain fancy yarns either the core, or core and binder, may have more influence on the general yarn appearance than the effect thread itself.

The high rate of delivery causes the effect thread to wrap round the core in a manner dictated by such factors as (*a*) turns per inch imposed in the fancy twisting operation, (*b*) counts of effect in relation to counts of core threads, (*c*) ratio of the lengths of core and effect yarns fed per minute and (*d*) methods by which the effect is joined with the core thread. When the core and effect yarns are joined together during twisting there is very little tension on the effect thread between the delivery roller and the point of joining. This calls for special care as the tensions of the effect thread may be easily upset by even the slightest rubbing.

A binder may or may not be necessary. A great number of fancy yarns are made with only core and effect threads. The addition of a binder is needed where the effect is liable to be displaced during winding, warping, knitting or weaving processes; or where a second twisting operation is required in opening out the effect with the object to get either a well defined gimp effect or a fuller and softer yarn than that obtained from the fancy twisting operation. The binder may be a single or a folded yarn. In some cases, it is similar to core thread in order to create a balanced effect as e.g. in the "diamond" type of yarn.

The binder is twisted almost invariably with the fancy yarn in the reverse direction to the fancy twist.

In a broad sense the core and binder constitute the foundations of many fancy yarns hence the name "base threads" given to them on the Continent.[20]

It goes without saying that a single or twisted fancy yarn can replace the core, effect or binder of a fancy yarn for the construction of some elaborate designs. In some types of fancy yarns the main purpose of the binder is accomplished as soon as the yarn is made into cloth, and its presence may be undesirable on account of an adverse effect which it may have on the handle and weight of the cloth. In certain fabrics retention of the core and/or binder may not be wanted in the fabric for the development of certain ornamental effects or textural characteristics. Alginate rayon is one type of yarn often employed as fancy yarn component It imparts additional strength temporarily and after its usefulness as a scaffolding thread can be easily eliminated from the fabric during wet processing.

Twisting Machines

Until now a general description has been given of the methods adopted in the ordinary processes of yarn manufacture for the production of fancy yarns. The modifications or alterations of the machines discussed were mainly of a minor character, although in some cases attachments and mechanical devices of special designs had to be employed in order to increase flexibility and efficiency. A reference to the very early attempts of producing fancy yarns in the process of twisting shows that fancy twisting has followed the same way of modifying or alternately adding the requisite auxiliary attachments to conventional twisting frames, as other spinning machinery. As a result of a public demand for novelty fabrics the twisting machinery builders were confronted with a steady demand for a versatile machine particularly suited to the requirements of the fancy yarn makers.

Today several such frames are offered. Their main features being versatility, ease of operation and facilities for quick alteration to the settings.

Ordinary Twisting Frame

This type of machine is remarkably adaptable for making an extremely wide range of yarns. The operator usually has only to select the right counts, amount and direction of twist in yarns, and by adjusting the machine to impart an appropriate amount of tension and folding twist the components are positioned in such a way in the finished yarn as to create some of the cheapest and most beautiful structures.

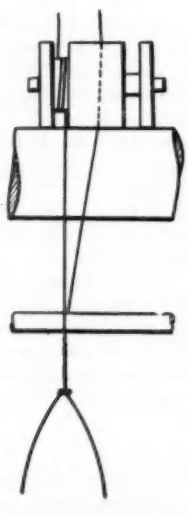


Fig. 27. Ordinary top roller with two channels cut into it

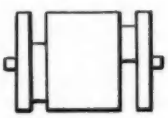


Fig. 28. Another example of either top or middle roller in which the channels have been cut in an eccentric manner for special effects

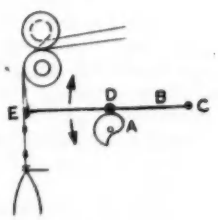


Fig. 29. Intermittent effects can be produced very effectively by a combination of channelled top roller with an oscillating bar to give the gimp or boucle, etc., type of yarns

In employing a twister for fancy doubling two main points must be considered. First, it is important to thread the component yarns in a manner securing their positive control. This becomes more vital when processing yarns of widely different counts. Thick threads may lift the top roller and prevent it nipping and controlling the fine thread, the latter thus being delivered at non-uniform speeds which must seriously affect the structural uniformity of the finished yarn. Practice has shown that the double nip yarn threading (Fig. 26) is adequate in the majority of cases. As will be observed from the sketch, the course of the yarn from the supply package is over the tension bars, through guide A and the nip of rollers—upwards encircling the top roller, around peg B and through the rollers again to be twisted and wound on to the bobbin. A second equally important precaution is to ensure that an appropriate tension is applied to the spindle drive. If for any reason a band or tape becomes slack the spindle speed is sure to be affected so that the yarn will not receive the desired twist. Yarns with wide differences between nominal and actual twist can often be detected on the bobbin but, unfortunately, this is not always the case with yarns with small differences in twist and these can pass unnoticed to produce eventually "barry fabrics."

Top Roller Modifications

The grooved top roller [21, 22] is probably one of the earliest and most useful devices used on ordinary twisting frames for excessive delivery of yarns. One simple design is an ordinary top roller having two grooves $\frac{1}{4}$ in. wide cut to a certain depth around its circumference as shown in Fig. 27. The core yarn C is wrapped twice round the base of the groove A, whilst the effect thread D is nipped between the bottom and top roller The ratio of the two deliveries is as the ratio of the respective diameters of the top roller. Groove B can be used for delivering the core thread at a lower rate. Rollers cut in an eccentric manner are often employed for the production of intermittent effects and Fig. 28 is a typical example. It will, of course, be observed that once a roller is prepared in this fashion it can be only utilised in most cases for the purpose for which it was made and consequently it presents definite limitations as far as reproduction of samples is concerned.

When the ratio of delivery is large, e.g., during the production of bouclé, gimp, etc., it is necessary to position a bar between the front roller and the guide lappets in order to provide a fixed point at which the excess yarn meets the core yarn. Without this bar the effect thread will be irregularly wrapped round the core. Intermittent effects can be made on yarns by incorporating the grooved top roller principle in conjunction with an oscillating bar. The working action of the bar may be followed from the sketch at Fig. 29. The cam A operates lever B fulcrumed at C, through an anti-friction bowl D. Lever B is moved up and down thus providing an appropriate speed to the bar E fixed at its extreme end. The effect yarn is guided on to a certain portion of the core creating an accumulation the shape and the size of which depend upon the speed and shape of the cam.

A two colour intermittent effect fancy yarn can be produced on the ordinary twisting frames by applying a two-rod oscillating arrangement, Fig. 30. A "T" lever fulcrumed at A swings by means of a cam and levers so that the tension rods B_1 B_2 move alternately towards and away from the fixed bar C. The amplitude of swing depends on the position of the extreme ends of the link lever E relatively to levers D and F. The yarns are separated after leaving the nip of the rollers by passing them over tension rods B_1 B_2, from which they converge and join together under the bar C. If the cam was put out of action, the two differently coloured threads would be twisted to form an ordinary two-fold "mottle" yarn. However, by allowing the cam to operate on the levers the tension rods approaching the fixed bar C alternately, present their respective threads at a faster rate than those delivered by the receding rods. The continuation of this process will produce yarns exhibiting two-colour effects alternate to each other at regular intervals along their lengths.

So far, an endeavour has been made to describe briefly the usual methods employed for the production of fancy yarns on the plain twister. This frame can be fitted with various attachments to satisfy a temporary need for some types of yarns. These attachments, although of interest to some mills, are of little significance to the manufacturer of fancy yarns as they can be produced more cheaply on special machines which, moreover, are also more versatile. Converted spinning machines are of greater interest than converted twisters on account of the fact that, unlike plan twisters, they are provided with more than one pair of delivering rollers. Many such frames are found in mills in which skilled technicians are capable of effecting the necessary modifications without incurring excessive expense. How far it is advantageous to convert a spinning frame to a fancy twister instead of buying a twister specially designed for the purpose is a question management must always settle for itself.

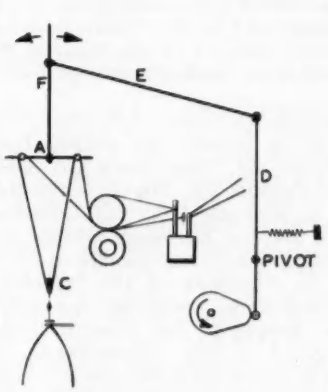


Fig. 30. Two colour intermittent fancy effect produced by employing a double rod oscillating arrangement

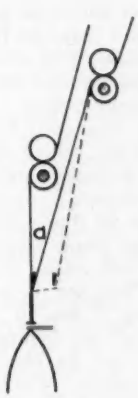


Fig. 31. Angle of conversion of core and excess yarns

Converting a Spinning Frame

Factors to note when considering the suitability or otherwise of a spinning frame for conversion to a fancy twister include the following:—

(1) Type of machine
(2) Size of yarn package.
(3) Range of twist.
(4) Ease of changing the direction of spindles rotation.
(5) Space in the creel.
(6) Space between front roller and threadboard.

Any type of spinning machine can be modified but flyer and, in particular, ringframes are to be preferred. Large packages which are generally employed on these machines allow quantity production with improved quality of the product. Large packages are highly desirable as they

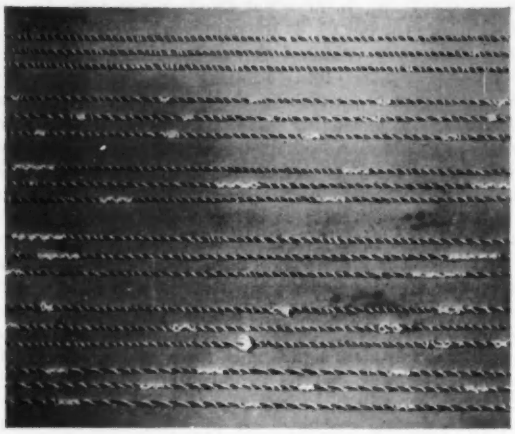


Fig. 32 (left). Five yarns made with different distances in bar-core

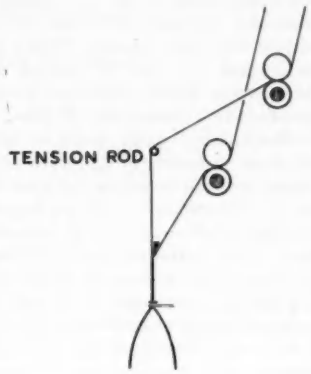


Fig. 33 (right). One of many different arrangements of additional tension rods for alternative methods of yarn threading

reduce the number of doffings and related manufacturing costs. These packages also contain fewer knots, a point which contributes in no small measure towards reducing mending costs. Facilities for a wide range of twist is necessary for the production of fancy yarns and, in addition, the change of the direction of spindle rotation must be easily made.

Some machines provide sufficient room on their creels for additional packages. Owing to the multiplicity of size and shape of yarn packages and to their varied assembly plans, even creels specially designed by the maker of the fancy twister at times have to be modified to meet particular requirements.

The need for a bar with the object of stabilising the point where the effect is formed has already been previously stressed, hence the requirement (6) space between front roller and threadboard. The bar is a strip of metal approximately 1 in. wide and $\frac{1}{8}$ in. thick extending the whole length of the machine, positioned between the front rollers and the threadboard and parallel to both. This bar is referred to sometimes as the "vibrating bar," due to its up and down oscillating movement, also as "gimping" or "knopping" bar when it determines the placings of gimps or knops, depending on its function. The bar must be supported at intervals so that its distance from the rollers is the same from one end of the frame to the other otherwise the effect thread will not wrap round the core in the same manner.

The relative position of the bar to the path of the core thread is also of great importance. The closer the bar is set to the core thread more regular is the created effect. Conversely, an irregular wrapping results when the distance between the core and the bar is increased.

The influence of the bar placing can be examined by referring to the diagram Fig. 31 and photograph showing typical yarns at Fig. 32.

A further item worthy of consideration, when discussing the functions of the bar, is the angle of conversion $\hat{a}$ of the core and excess threads (Fig. 31). When this angle is acute then the protruding fibres of the effect yarn may be caught by the core at the top of the bar. This can give rise to excessive yarn breakage, or it may produce small effect thread accumulations on the fancy yarn. Whatever happens such an effect can be prevented by using a wider bar or by altering the threading path of the core yarn.

An oscillating motion imparted to the bar by a suitable crank or a cam arrangement will also provide a means for altering the amplitude. However, unless this device is mechanically sound it will not prevent trouble producing yarns differing in structure. This difference in yarn characteristics is better seen by comparing bobbins taken from the extreme ends of the frame. Very long machines do not lend themselves readily for this motion and many incline to the view that a 90-spindle per side is the maximum practicable length of spinning frames to be modified into fancy twisters. Other useful alterations may include:—

(1) Addition of tension rods for alternative methods of yarn threading (Fig. 33) and front roller guides to keep the yarns in their proper places.
(2) Removal of the carrier rollers and clearers of the spinning frame to facilitate operatives work and to increase efficiency.
(3) Replacing the top front roller, if they are not sufficiently wavy, by the back top rollers. This is conveniently done on the French type of ring spinning frames by leaving the top back rollers in their positions and utilising the tumblers of the back carrier on the front roller.
(4) Introduction of intermittent roller delivery for the production of discontinuous effects.

References

(20) "Torcitrice Fantasia". Officina Mechanica Sant, Andrea, Novara, Italy.
(21) J. Dantzer, D. De Prat "Fabrication des Fils de Fantaisie" Librairie Polytechnique, Ch. Beranger, 1930.
(22) S. Wakefield. "Cotton Doubling and Twisting"

New German Hydrogen Peroxide Plant

The Elektrochemische Werke München A.G., which earlier this year became a member of the Laporte Industries Group, is to construct a large-scale plant for the production of hydrogen peroxide by the Laporte autoxidation process, operated in the U.K. by Laporte Chemicals Ltd. at Warrington. The new plant will be at Höllriegelskreuth, near Munich.

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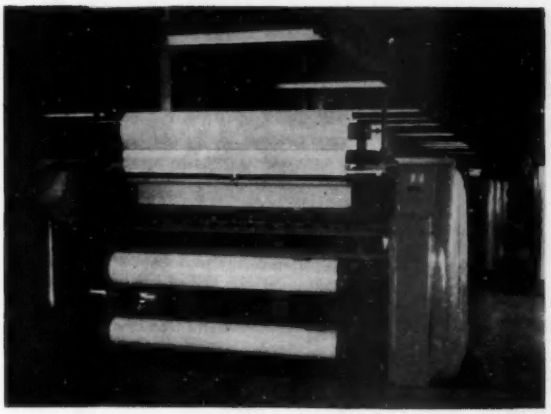
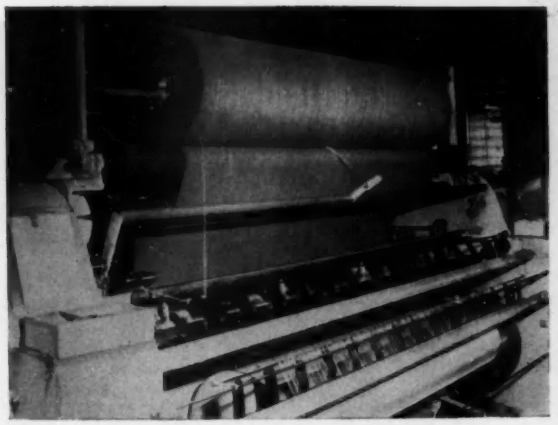
N.Z. Government and Wool Cloth Imports

The New Zealand government is doing all it can to allow the maximum quantity and variety of wool fabrics into the country, says the Minister of Trade, J. R. Marshall, replying to representations by the national organisation, Federated Farmers. Import provision for 1961 is 100% of 1960, with special provision for certain types of cloth, and provision for additional imports of wool piece goods during the first six months of 1962 has been made.





Figs. 1 and 2. A view from the front and a close-up "shot" of the new P-1 Arachne stitch-bonding machine

New Non-Woven Fabric Production Techniques

More than fifty Arachne stitch-bonding machines are operating in Czech mills and plans were being made to produce 8·4 million sq. yds. by the end of this year. The fabrics have many end-uses

By A SPECIAL CORRESPONDENT

THE highlight of the recent symposium on non-woven fabrics, held in Prague, was undoubtedly the release of detailed information concerning the stitch-bonding methods embodied in the latest Czech Arachne machine. Stitch-bonding methods have also been developed in the German Democratic Republic and in Russia and the Arachne was invented by Mr. Josef Zmatlik who was later awarded a state prize for his invention. The first Czech patent (No. 85832) was applied for in 1949. Several years' research and development work have been carried out by the Knitting Industries Research Institute in Brno and the Model P-1 was produced in small numbers in 1958 after the prototype had been thoroughly tested. At present, there are more than fifty Arachne stitch-bonding machines in actual mill operation in Czechoslovak cotton, woollen and other textile mills. An experimental stitch-bonding department, established at the Benesov division of the Kolora Corporation, a large manufacturing combine for cotton textiles in Northern Bohemia, has fifteen Arachne P-1 machines and the necessary web-forming machinery.

The photographs (Figs. 1 to 5) were taken in this department during the symposium. Fig. 1 shows the front of the P-1 and, as will be observed, it is rugged and compactly built; Fig. 2 is a close-up of the same machine. To check the yardage of stitch-bonded fabric produced a fine paper tape with linear measuring scale is generally wound into the fabric lap. The tape reel is in a bracket attached to the upper control bar of the machine. Fig. 3 shows the rear lattice table on which two supply laps are being unwound. The number of supply webs is usually from one to three and sometimes webs of different materials or colours are used.

The stitch-bonding layout of the experimental Arachne department is shown in Fig. 4. It is L-shaped, one leg of the L being taken up by the stitch-bonding machines, the other leg containing the web-forming equipment seen in Fig. 5.

Web preparation takes place on Blamire type cross-lappers, like that in the foreground in Fig. 5. The web-forming set contains two revolving flat cotton cards delivering the webs by lattices to a cross-lapping device that

Fig. 3. View of the P-1 from the back showing the feed lattice unrolling two supply webs

Fig. 4. Part of the Arachne experimental department showing stitch-bonding machines and web-forming equipment

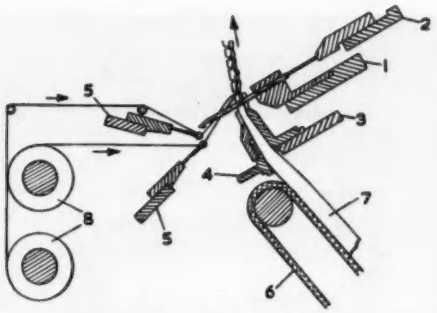


Fig. 6. The stitch-forming elements

lays them on a third lattice perpendicular to the two feed lattices. The card webs are thus cross-folded and condensed to form a web of the desired weight per square yard. The fibre web thus formed is calendered and wound-up on to a lap on the traversing lapping carriage of the web-forming set. The card webs are oriented in the lengthwise direction and the webs for stitch-bonding in a cross-wise manner. This orientation of the webs is not considered a disadvantage. On the contrary, it helps strengthen the stitch-bonded fabric in the "weft" direction and the "warp" direction needs no additional reinforcing as the numerous rows of stitches inserted into the webs give the non-woven fabric the necessary strength lengthwise.

Randomised webs, e.g. those prepared on the Rando-Webber, can also be used as well. The present web-forming technique, however, requires no new equipment and the cross-lapping attachment could easily be manufactured by any textile engineering works. Arachne stitch-bonding machines are not, however, used solely only in the cotton industry, as a fair number of them are in normal mill operation in several Czechoslovak woollen mills.

Whereas the manufacturing techniques for cotton-type non-wovens (using cotton, cotton waste and cotton-type man-made staple fibres) are practically free from problems, it is not quite the same as far as the woollen industries are concerned. Here the problems are mainly met in those stages after stitch-bonding, e.g. suitable finishing techniques, price-relationships between woollen stitch-bonded and woven fabrics, etc. Nevertheless, considerable yardages of non-woven woollens are being turned out and used in men's, ladies' and children's outerwear. For example, one type of non-woven woollen fabric has been remarkably successful for men's Continental style raincoats. Even experts in woollen cloths have mistaken this particular non-woven fabric for the traditional woven article and many have been puzzled by the close similarity of both materials. Interestingly enough, this particular example has certain notable features which are better than those of its woven counterpart. The manufacturing price is much lower, of course, and more inferior materials can be incorporated in a blend without impairing the appearance, handle and quality.

Constructional Features

The Arachne machine consists of the following main functional elements: (*a*) frame, (*b*) drive mechanism, (*c*) needle bar, (*d*) thread guide bars, (*e*) fabric take-up, (*f*) warp let-off, (*g*) web transport device, (*h*) starting device and (*i*) selvedge-cutting attachment.

The stitch-forming elements are shown diagrammatically in Fig. 6. The special type latch needles are held in the needle bar 1 (in leads having six to eight needles, according to the gauge), each group being attached to the needle bar by a screw. The needles are positioned obliquely and their operational movement in penetrating through the web is downwards toward the front. The needle latches are held

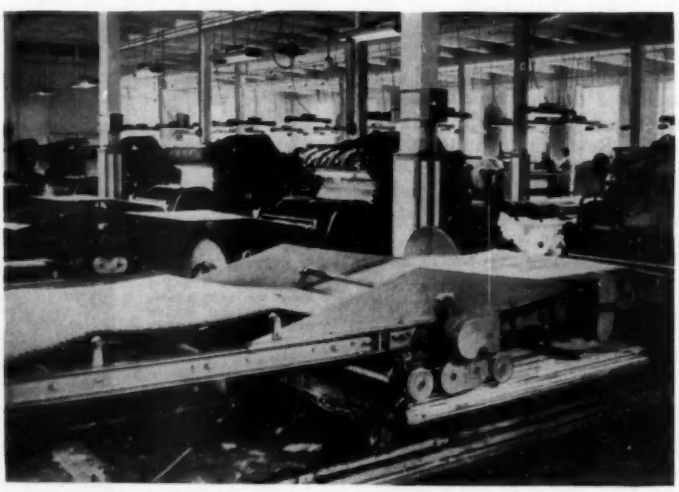


Fig. 5. Web preparation is carried out on Blamire-type cross-lappers

Fig. 7(a). Penetration

Fig. 7(b). Thread feeding

Fig. 7(c). Needle hook closing

Fig. 7(d). Knock-off

Fig. 7(e). Draw-off

in latch bar 2 and the latches are terminated by spoon-like devices which serve both to close the needle hook and to remove impurities from the inside longitudinal bore through which the latch wire moves in each needle. Needle and the latch bars are controlled by eccentrics on the main cam shaft of the machine and the controlling movements are transferred by a system of rods and levers.

Arachne machines can work with one or two warp thread guide bars 5 which feed the stitching threads to the needles and can perform various lapping movements to achieve various stitching weaves. Dependent on the number of the warp thread guide bars employed, the machine is supplied with the appropriate stitching threads by one or two warp beams 8.

The warp thread guide bars perform two movements: (*a*) an axial lapping movement and (*b*) a swinging movement. In one knitting cycle the thread guide bars perform four individual movements. From the starting position behind the needles the guide bar swings forward in front of the needles. Then it is shogged sideways, at the same time feeding threads to the individual needle hooks, and then receding behind the needles again. Another shogging movement behind the needles brings the needle bar into the starting position again and a new knitting cycle thus begins. Both kinds of thread guide bar movements are also controlled by eccentrics on the main cam shaft.

The machine has two systems of sinkers. The knock-off sinkers are held in a stationary knock-off sinker rail 3, whereas the closing sinkers in the form of short flattened rods are imbedded in a movable rail 4. They have to confine and close the web in a given position in order to prevent it being pushed away by the stitching needles. Confined in a slit between the knock-off sinker comb and the closing sinker comb the web is thereby easily penetrated by the stitching needles.

The web 7 is fed to the stitching mechanism by an endless lattice 6. The closing sinker rail 4 is movable, performing a swinging movement at the appropriate moments. While the needles penetrate forward, the closing sinker rail is in its top position and the stitching needles pass through the slots of the closing sinker comb. After the stitching needles have reached their foremost position the closing sinker comb is brought downwards to prevent the formed thread loops wrapping around the closing sinkers.

Stitch Formation

The actual stitch formation requires extremely accurate timing in all mechanisms concerned. The knitting cycle, in five basic stages, can be followed from Figs. 7*a* to 7*e*. In these stages the needle, latch and thread guide bars, together with the closing sinker comb and the web-feeding mechanism take up various operative positions. The whole knitting cycle can be divided into the following stages:—

(1) Penetration.
(2) Thread feeding.
(3) Needle-hook closing.
(4) Knock-off.
(5) Draw-off.

During penetration (Fig. 7*a*) the needles are thrust forward from starting position at the rear. The latch bar moves slower and, for this reason, the needle hooks open as the needles pass through the knock-off sinkers, the last-formed stitches and the fibre web. The needles, having penetrated forward, have their hooks open, the slide-wire latches being concealed in the longitudinal needle shaft bores. During needle penetration, the web is held and confined by the closing sinker comb and penetration ends by the needles coming out to their foremost position at the front side of the fibre web. During the feeding stage, the thread guides feed their respective warp threads to the open needle hooks. Afterwards, the needles start to recede (Fig. 7*b*).

In the third stage (Fig. 7*c*) characterised by the closing of the needle hooks, the latch bar moves slower than the needle bar and this entails a closing of the needle hooks by the spoon-shaped ends of the slide-wire latches. Needle hook closing occurs the moment the needle points pass through the closing sinkers. The needles firmly hold their warp threads in the closed needle hooks and draw them through the fibre web and through the previously formed stitches which are supported by the knock-off sinker rail.

Immediately the newly formed loops have passed through the previously formed stitches, new stitches originate and the previous stitches are cast-off in front of the needles. The needles continue to recede between the knock-off sinkers to their rear position (Fig. 7*d*). When the stitching needles have cast-off the previous stitches and their hooks pass through the knock-off sinkers, the draw-off mechanism advances the web one stitch length. The amount of forward movement per stitch can be set between wide limits according to the required density of stitching (Fig. 7*e*).

Speeds and Productions

The Arachne P-1 machine has three operating speeds, viz. 270, 380 and 504 r.p.m. The machine gauge is 18,

21 and 24 double Saxon gauge (the gauge indicates the number of needle pitches per 2 Saxon in., i.e. per 47·2 cm.). The working width is 180 cm. (about 71 in.). The various gauges have the following numbers of stitching needles: 18 gauge—690 needles; 21 gauge—805 needles; 24 gauge—920 needles. Depending on the cloth, provision is made to set from 5 to 40 stitches/in. Fibre webs weighing from 4 to 28 oz./sq. yd. can be used. The machine efficiency is 60 to 85% and the production per 8-hour shift is 165 to 500 yds. of stitch-bonded fabric.

The machine dimensions are: length 11 ft. 1 in.; width 9 ft. 11 in.; height 4 ft. 5½ in. Total weight is about 4,850 lb. and the power consumption is 2·2 kW.

Plans were made in Czechoslovakia for about 8·4 million sq. yds. of various Arachne stitch-bonded fabrics to be manufactured in 1961. The fabric assortment is very large and includes warmth-retaining stitch-bonded fabrics combined with woven fabrics attached during the stitch-bonding process, for special winter working apparel. Other end-uses are as (*a*) stitch-bonded wadding; (*b*) stitch-bonded packing and wrapping cloth; (*c*) interlinings of all kinds and stiffeners, etc.; (*d*) shoe-making fabrics for uppers and linings; (*e*) base cloth for leatherettes; (*f*) filter cloth. In addition, a large assortment of stitch-bonded fabrics are made from various materials for men's, ladies' and children's outerwear, also for furnishing fabrics, and many other potential outlets are currently under investigation or undergoing practical trials.

From a quantitative evaluation of the various methods for production cloth, the Arachne experimental department of the Kolora Corporation state that the Arachne process increases the productivity per worker in comparison with automatic cotton looms in the ratio of 282:100 as far as production is concerned and in the ratio of 308:100 when yardage is the basis. It is also pointed out that the production value per 1 sq. yd. of manufacturing area per unit time is increased in the ratio of 465:100. Other manufacturing factors are set out in Table 1:—

Table 1

	Cotton Loom	Arachne
	%	%
Basic material ..	49·8	53·9
Waste for re-processing ..	1·2	0·3
Basic wages ..	8·8	3·6
Overheads ..	36·9	18·5

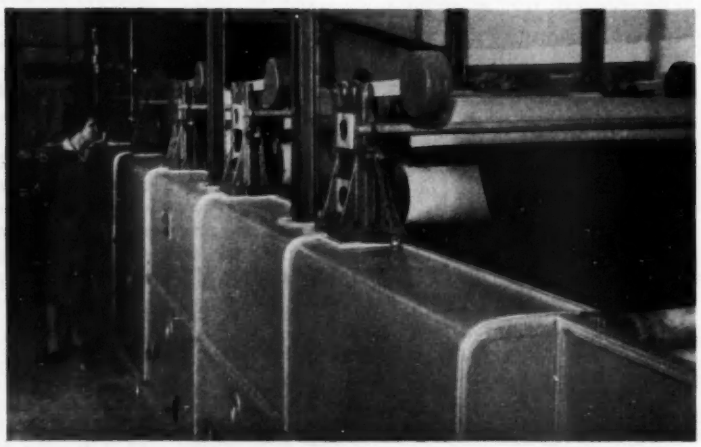
A noticeable feature of the process is the fact that the stitch-bonded fabrics contain only about 15 to 28% of warp material. The Arachne and ancillary equipment for a given yardage per year is less expensive than the conventional spinning and weaving equipment needed for the same volume of woven fabrics. For this reason, it is felt that this new development will appeal to those under-developed countries faced with the necessity to provide low-cost warm apparel for their populations at minimum investment cost.

Another point about Arachne machines is their quiet operation compared with orthodox looms. The working environment is also claimed to be more pleasant and lint-free than in the usual spinning rooms and weaving sheds. As far as speed is concerned the designers are confident they will, in the near future, double the present speed and future models will be equipped with efficient stop motions to ease the work and enable operatives to take on more machines without undue fatigue.

It is the intention, in another article, to describe the design of stitch-bonding equipment developed in the German Democratic Republic and in the U.S.S.R.

Automation in Cloth Finishing Processes

A machine line which the Hungarian textile industry claim to be a great step forward in the automation of finishing processes has been built at the Lóden Cloth Factory, Budapest. The line, which is 177 ft. long, needs only four operatives. It gives, it is stated, a complete finish to the cloth by washing, drying and ironing and additional finishing treatment to impart crease-resistance. It has an annual output of nearly 2,750,000 yds. of cloth. Though the machine line cost £150,000 to be built, it is expected the cost will be recovered with the first year's output.



A view of a section of the new finishing treatment line to impart crease-resistance

STANDARDS ON TEXTILE MATERIALS—COMMITTEE D-13. American Society for Testing and Materials, 1916 Race Street, Philadelphia 3, Pennsylvania, U.S.A. (price $10).

The 1961 compilation of A.S.T.M. Standards consists of 149 standards and tentative methods of test for many widely-used products in the textile industry. This volume contains 45 new and revised standards and tentative methods of test; several proposed methods of test; a complete index; a list of the personnel in A.S.TM. Committee D-13 on Textiles, and a summation of the scopes and objectives of this committee.

Among the new standards is a list of commercial moisture regains for textile fibres. New methods of test include those for determining yard number (skein method), dimensional change of woven and knitted textiles and yarn severance of woven fabrics. This new compilation provides in compact, convenient form, data and information of importance to all who deal with textile materials.

* * *

TECHNOLOGICAL REPORTS ON TRADE VARIETIES OF INDIAN COTTONS. Tech. Bull., No. 105. Dr. Iyengar (price Rs. 5).

These reports are concerned with cottons in the following categories: Maharashtra State (7); Gujarat State (10); Mysore State (3); Andhra Pradesh (1); Madras State (8); Madhya Pradesh (1); Punjab (3); African (5).

Yarn Tension, Spindle Speeds and End-Breaks

In machine and operative efficiencies the main contributing factors include spindle speed, traveller weights, yarn balloon, bobbin and ring diameter ratio and yarn count

(*continued from "T.M." June, p.228*)

By J. A. B. MITCHELL, C.G.I.A.

THOUGH the latest forms of ringframe for woollen spinning differ markedly in many details from the earlier patterns, the really important differences are those responsible for yielding even higher production per spindle, heavier and firmer packages, and providing greater adaptability for spinning soft twist yarns. Better yarns and improved spinning performance are other advantages offered by these new frames with variable-speed spindles. Yarns with low twist intended for hosiery, or those of poor quality relative to count, were often better made on the mule than on the frame, The main drawback of the existing pattern of frame when spinning yarns of low quality and/or with soft twist arises from the use of constant-speed spindles and the rather high spinning tension encountered, both tending to create conditions unfavourable to the attainment of large output, compactly built cops and a spin with few ends down. On machines with constant-speed spindles three important factors limit the speed of spinning and hence the output of yarn. These are:—

(1) **The optimum delivery rate from the front rollers consistent with easy "piecing".**
(2) **Traveller speed in relation to wear and tear.**
(3) **The effect of spindle speed on end breakages due to increased tension on the thread.**

Factors (1) and (3) are of vital concern in the allocation of work load for operatives minding the machine. Each user of the frame must decide on an economical spinning speed for a particular yarn count and quality in terms of the number of ends down per 100 sp./hours and a reasonable flow of thread from the rollers appropriate to the minder's manual skill to make a satisfactory piecing. This operation is made more difficult under conditions of high tension accompanying a fast spinning rate, and is obviously likely to be worse when spinning yarns of low strength due to unevenness or inferior quality. Previously a spinning rate of 16 yds./min. was considered the upper limit for making a sound piecing and at the same time ensure efficient control of the process and the machine. On many yarns with soft twist the speed has perforce to be kept down in the interests of securing a manageable flow of thread from the rollers. On the new frames, with ancillary devices on the spindle for controlling spinning tension, the piecing manipulation is said to be much easier, and a roller delivery rate of 20-21 yds./min. is now being reached on medium count yarns.

Scottish Woollen Technical College

In recent years the use of nylon travellers and anti-wedge rings has made it possible to attain a traveller speed of over 100 ft./sec. but as Table 2* indicates the r.p.m. of traveller and spindle must fall in proportion as the diameter of the ring rises if a certain maximum velocity of traveller is to be maintained. Commenting on the statement appearing in the previous article that "100 ft. /sec. must be regarded even yet as a risky ceiling figure" Eadie Bros. and Co. Ltd., Paisley, point out that "95 ft./sec. is nowhere near the maximum speed for a steel traveller on a self-lubricating ring, since speeds up to 180 ft./sec. are of frequent occurrence, and even 220 ft./sec. has been reached in commercial use, though not in woollen spinning." They maintain that if a traveller can be run satisfactorily at, say, 180 ft./sec. when spinning rayon, and this speed cannot be achieved on woollen or other yarns, then it is due to limitations other than the ring and traveller." Later the firm states "We know of one mill in Yorkshire which spins carpet yarns at a delivery speed of 1,180 in./min. using a nylon traveller at a speed of 120 ft. /sec. This has been achieved by careful attention to detail and if it can be done in one mill it is possible for others."

Nevertheless the peak figure likely to be reached by a traveller for spinning or twisting is somewhat difficult to gauge since it varies in different sections of the textile industry. In any case the workable speed of a traveller is influenced by several factors, not least being the working life expected from it. In this connection Messrs. Eadie state that "continuous high-speed running does not cause uneconomic damage to self-lubricating rings" and in support of their contention suggest that one weeks' life is not necessarily a poor one for a traveller, if during that time, it has performed well. Two examples of modern usage are given, one where travellers, though not worn, are changed after slightly less than five hours run on draw-twisting synthetic yarns, during which time 95 miles of thread have passed through to the spindle. The second example quoted is where the life of a nylon traveller is around 2,000 running hours at 112 ft./sec. when cabling rayon tyre cord.

As well-known makers of rings and travellers, naturally concerned with safeguarding their reputation and upholding just claims for their products, they nevertheless agree that one of the decisive factors in fixing the working life of travellers is the economics of regarding them as highly

* "*T.M.*" *June* 1961. *p.228.*

expendible or otherwise in relation to costs. Frequent replacement of travellers and the time taken to change them may cause a loss of production which outweighs any gains by spinning at the maximum permissible speed dictated by the resistance to wear of the ring and traveller. That is a problem which each firm will have to solve for itself. In view of Messrs. Eadie's authoritative statements it is perhaps unfair to create the impression that 100 ft./sec. is the present maximum velocity attainable under all conditions by a steel traveller on a self-lubricating ring, though this figure is being currently recommended by one maker of the spinning frame as being about the top speed for reasonably long service on woollen yarns, while 120 ft./sec. is suggested as the comparable figure for nylon travellers as used on the latest ring frames. Except when spinning carpet and blanket yarn on large package machines with 5 in. dia. rings, few woollen weaving yarns in the finer count range will be spun at spindle speed over 7,000 r.p.m. on rings 3 in. or 3½ in. dia. in which case the velocity of the traveller is within these limits. Nylon travellers at 1*d.* each are many times more costly than the standard steel travellers and are recommended as being ideal for spinning at top speed those woollen yarns with medium to soft twist, though liable to wear quickly on threads with hard twist for warp. In the latter case ordinary steel travellers are more satisfactory.

Regarding the effect of spindle speed and spinning tension on the number of end-breaks much time and experiment have been given recently to the study of all factors involved in the basic operation of twisting and winding a thread by means of ring, traveller and spindle. It is suggested that in the majority of cases yarn strength, not traveller speed, controls the maximum spinning speed of the ring frame spindle. In the conventional set-up, shown in Fig. 2, the eyelet *X* in the lappet appears to act as a mild twist barrier, with the result that the full quota of twist, generated by the rotating traveller *T*, seldom if ever reaches that portion of the thread near the nip (*a*) of the front rollers. Consequently this small region, somewhat deficient in twist, constitutes a weak place in the emerging thread. The instantaneous strength of the yarn at the roller nip is affected by fibre length and fineness, yarn count and twist. The tension the thread can withstand here limits the weight of traveller, diameter of ring and spindle speed, and is decidedly lower in yarns of poor quality or those with few turns twist. It is now better understood and appreciated that this vulnerable place in the thread, by being denied full support from twist, is prone to draw unevenly or break down under high tension, so that the spinning rate has of necessity to be curtailed in the older patterns of machine. The latest models of woollen ring spinning frame are designed to alleviate the tension on the thread at this point by forcing the twist right up into the nip of the rollers.

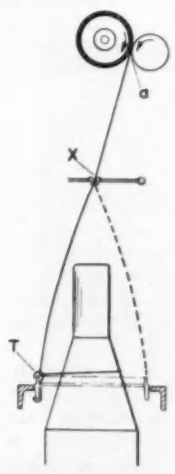


Fig. 2. Sketch of conventional ring-frame arrangements

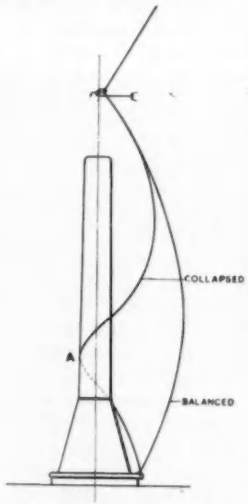


Fig. 3. Collapse of unstaple yarn balloon

Tension Factors

Consider again the many factors involved in the process of simultaneously twisting and winding a thread through the media of a ring and traveller surrounding the spindle. Tension in the yarn arises because, in order to keep the traveller and the loop of yarn rotating, work must be done by the spindle against ring-traveller friction and air-drag. Tension on the thread while spinning depends on several factors and varies appreciably with changes in any one of them. The main factors are:—

(1) Spindle speed.
(2) Weight of traveller.
(3) Length of yarn balloon.
(4) Ratio of bobbin diameter to ring diameter.
(5) Count or weight of yarn.

In frames fitted with spindles operating at constant speed, factors (1), (2) and (5) are fixed for a particular machine and yarn, while (3) and (4) vary throughout the filling in frames with reciprocating ring rail. Tension on the thread rises with an increase in spindle speed and/or weight of traveller and vice-versa. Actually, other things being constant, the tension on the yarn varies as the square of the spindle speed and appears to vary proportionately as the weight of the traveller. Thus for workable conditions with few end-breaks, the size of the traveller and the spinning speed must be regulated to suit other controlling factors, especially the maximum tension the thread will withstand at the start of a new filling, and intermittently throughout the filling, when winding on at the nose of the cop. Under conditions of constant-speed of spindle on a given count and strength of yarn the size of the traveller to produce a compact cop invariably limits the spindle speed.

Stated another way the weight of traveller permissible depends on the ability of the yarn to withstand, without breakage, the high tension when winding on at the minimum diameter, i.e. at the very commencement of the filling and cyclically throughout the filling as the coils of thread are being applied at the top of the "chase" or nose of the cop. Under certain circumstances this may give rise to a soft body on the cop and restrict the weight of yarn per tube. Broadly, the connection is such that as the speed of the spindle rises the workable weight of the traveller must fall. In raising the speed of the spindle, to the accompaniment of a decrease in size of traveller, the thread may balloon out too much when winding-on at the shoulder of the cop, i.e. at the base of the cone, so as to render the balloon unstable and cause it to collapse as shown in Fig. 3. The speed of the spindle at which balloon collapse occurs depends on (*a*) *the length of the thread balloon*, and (*b*) *the product of count: spinning tension*. In the popular pattern of frame with reciprocating ring plate, the thread balloon will be at maximum length at the start of the filling, so that the danger period for its collapse will likely be some little time after the commencement, viz. when the conical base is well developed and the shoulder of the cop is wide enough. As the cop body builds up, with the ascent of the ring-rail, the balloon inevitably shortens and the chances of collapse tend to diminish.

In constant-speed spinning the effects of varying tension, as the length of the balloon changes throughout the build, can be lessened by using a reciprocating spindle-rail in conjunction with a stationary ring-rail. By this arrangement of the lifter motion the distance (d) between the eyelet X in the lappet and the traveller T remains the same over the entire filling (l) as in Fig. 4. This pattern of frame was adopted as standard for many years by American machine-makers and has been featured in Platt's MWR2 machine for large packages. However, in the newer technique of ring spinning, based on the results of an intensive study of spinning tension and balloon collapse, the idea of a fixed length of balloon is no longer regarded as the complete answer to the problem which has hitherto limited the output per spindle, the size of the spinning package and the range of yarn counts and qualities workable on the continuous frame.

To meet the modern demand for a heavier spinning package the machine-maker has adopted the obvious expedient of increasing the length of the spindle and the diameter of the ring, but these changes raise difficulties in that the yarn balloon is lengthened appreciably and the prevention of its collapse becomes obligatory if high speed of spindle is aimed at in the interests of output. By reducing the weight of the traveller the tension on the yarn may be lowered to the critical point which endangers the stability of the balloon. Experiments have shown that it is possible to reduce tension below a practical working limit and, more important, that if the thread balloon is lengthened the tension on the thread has to be increased to keep it above the danger level. Thus a vicious circle is set up by balloon length, traveller weight and spindle speed when spinning any yarn, especially medium and thick counts on a fairly large container. Investigations on spinning frames have revealed that the product of count: tension is more important than the absolute value of either in determining the optimum permissible spindle speed, and further, that if spindle speed is doubled then the yarn tension must be increased by a factor of four to prevent collapse of the thread balloon.

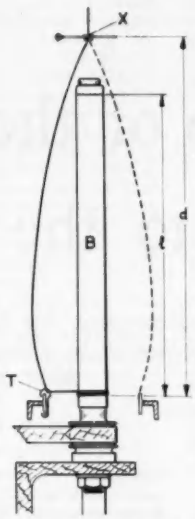


Fig. 4. Using a reciprocating spindle rail in conjunction with a stationary ring rail

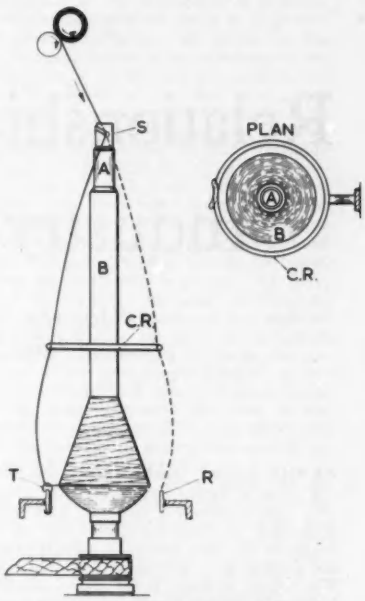


Fig. 5. Control rings are becoming standard fittings on the latest frame

Balloon Control Rings

By raising spindle speed in an effort to secure maximum production the weight of traveller required to prevent collapse of the balloon may so increase the spinning tension to a degree which causes a significant rise in a number of thread breaks below the front rollers. Admittedly strong yarns will allow greater spinning tensions and therefore permit the use of higher spindle speeds. However, the fact that yarn tension cannot exceed a certain value rather limits fast speed spinning, particularly on the longer lift frames where air-drag, acting on the longer loop of yarn, causes it to balloon out more. Rising and falling lappets are employed on some frames to give a thread balloon which remains more nearly constant at the upper and lower limits of the lift, but control rings, (Fig. 5) are now becoming standard fittings on the latest frame for woollen spinning when the lift is 12 in. or over.

The height and diameter of the balloon formed by the rotating loop of thread are restricted by control ring CR encircling the bobbin B and located some distance above the spinning ring R. The control ring, roughly of the same diameter as R, is open at the front—to allow entry of the thread when "piecing"—and reciprocates in conjunction with the ring rail but at a slower rate. Some results obtained during the study of spinning tension on cotton ring frames show that with a single control ring it is possible to achieve a 30% increase in spindle speed on coarse counts, though for the finer yarns the increase is only about 9%. The relative effect of air-drag to centrifugal force acting on the yarn balloon is greater for fine than for coarse counts. Control rings have a progressively increasing effect on maximum spindle speed as the count becomes coarser. There is no reason to doubt that the same holds good for heavy woollen yarns. Tests have shown that rings are unnecessary for balloon control if the lift is below 10 in. except under very unusual conditions. Without the control ring for large-package spinning collapse of the balloon can only be avoided by using a heavier traveller which might cause an increase in thread-breaks, or alternatively, by reducing spindle speed which inevitably curtails production. Briefly, the advantages obtained by the use of balloon control rings on frames with lifts of 12 to 16 in. are faster spinning speeds, with consequent higher output per spindle and the use of lighter travellers, which lessen the strain and leave the yarn with a softer and fuller handle, combined with improved spinning performance especially on poor quality blends and hosiery yarns which have little twist.

Another factor contributing to greater adaptability of the latest ring frames for woollen spinning is the provision, through the design of the spindle, of some means of carrying the twist right into the roller nip, thereby giving the full measure of support to the fibres in the drawn slubbing at the point of emergence and strengthening the thread so as to bear the tension when spinning at high speed. In the latest British and Belgian frames the spindle has a special fitting on the top which assists in feeding back the twist. Two have a form of "flyer" device which combines with the traveller in the insertion and distribution of the twist at the most vulnerable place between spindle point and roller nip. One Belgian make has a gadget on the top of the extended spindle to produce a captive or collapsed balloon.

(*to be continued*)

Relationship of the Man-Made Fibres Industry to the Cotton Industry*

"Let the fibres compete, but let the users of fibres of whatever kind build together on the foundations of the many interests they have in common

By D. R. B. MYNORS†

THE cotton industry and the man-made fibres industry are closely interconnected, but just how much does each of these industries rely on the other, in the first case as a market and in the second as a source of raw materials? The cotton industry is the man-made fibre industry's largest customer. During 1960 cotton spinning accounted for over 50% of U.K. home deliveries of staple fibre and so-called cotton weaving for 65% of home filament yarn deliveries. Overall nearly one-half of U.K. total deliveries of man-made fibres (including exports) during the year were to some part of the cotton industry.

Conversely the cotton industry itself is heavily dependent upon man-made fibres as a source of raw materials. During 1960 130 mn. lb. of staple were used by cotton spinners and this formed 17% of their total fibre consumption; in weaving, man-made fibre and mixture cloths accounted for 620 mn. yards of the total fabric production of 1,900 mn. yards, or nearly one-third of the output. In terms of employment we can claim that over 45,000 of the 170,000 people statistically recorded as employed in the cotton industry are working on man-made materials.

One of the major contributions of man-made fibres has been the assistance it has given to the consumer in developing a better and wider based wardrobe and the fabrics resulting from these widespread advances in man-made fibres have achieved new high standards in stability, durability and easy-care properties. Man-made fibres have also given considerable benefit to industry and consumer in the form of day-to-day stability of prices, while over a longer period passing on the reduction in costs arising from increased scale of production of new fibres.

In the wide field of research the producers have not confined themselves to developing their own products but have, both by their own work and by financial assistance to independent Textile Research Organisations, assisted the manufacturing section of the industry to an extent never contemplated by the farmers who offer you their natural fibres. As a particular example, this has led to the development of the modified cotton spinning system. Further, the scientific approach to testing and quality control that is needed to introduce a new raw material satisfactorily to the consumer has been applied to the traditional natural fibres with beneficial results.

The modified cotton system has extended the market for cotton spun yarns into sectors previously served by the wool/worsted industry. The cost saving is not only in the price of the raw materials, but also in the conversion cost which on the modified cotton system is one-half or less of that in the worsted system. Currently nearly one-quarter of all deliveries of man-made fibres to the cotton spinning industry are to the modified cotton system.

Expanding Markets

Similarly the use of spin dyeing and the texturising and bulking techniques possible with man-made fibres have enabled the cotton weaving industry to extend the range and quality of the fabrics it produces and this has enabled it to expand its markets. The special properties of the acrylics have been exploited to produce blankets made of "cotton-spun" yarn that are much lighter in weight than wool but with no reduction in warmth.

The wide variety of fibres that are now available each possessing particular qualities in differing degrees, has led to a rapid extension in the development of blends and mixtures to provide combinations better adapted to individual end-uses.

The fortunes of the man-made fibres industry are directly related to those of our customers in all the branches of the textile industry in this country. Although some £20 mn. worth of fibres are exported each year by the producers, most of the large textile producing countries have their own man-made fibres industries and the scope for exports of our fibres and yarns as such is limited by this fact. Some 70% of my own company's assets are related to the manufacture of textile products and materials, and if there was no market for our goods in the U.K. we should be hard put to it to find an alternative demand. This is a fundamental factor in our business and all British fibre producers recognise how essential it is that the industries they supply are competitive in price, quality and style with the products of their competitors in other countries.

In production the Lancashire textile industry has many advantages over competitors. Generations of experience are part of your inheritance and to this you can add the benefits of continual research and an ever expanding choice of materials. This seems to favour the use of man-made fibres as against cotton and within the man-made fibre field itself to favour the newer developments. In concentrating on such goods your industry will be better able to survive the inevitable disruption caused by competition in plain cotton goods from Far Eastern countries and emergent colonial territories with lower wage levels: this competition must realistically be expected as a permanent feature of our economy. Indeed, within the man-made fibre field itself the same competition is likely to increase in the simpler kinds of product where cost reduction is all important and technical and styling factors less so. If, therefore, the present trends continue it seems likely that the Lancashire industry will not only use a greater proportion of man-made fibres than at present in line with the continued world-wide growth still taking place at the expense of natural fibres, but will have to concentrate on them still more as a means of exploiting its technical inheritance in an age when simpler techniques are known all over the world.

Competition from Far Eastern countries will continue to have a much more severe effect on the producers of the older man-made fibres than many realise. Loss of the old British fabric export markets for rayon goods has been as bad for the rayon producer as for the textile manufacturer who bought his yarn or the dyer who dyed and finished and printed the cloth: furthermore there is no assurance that a new local industry will buy yarn or fibre from the same country from which it once bought cloth. To a great extent therefore we are all in the same boat as the cotton-using industry when questions of foreign competition arise. The newer synthetics do not yet come in this category but even they can be expected to reach the stage of development in due course when markets are more difficult than during their youthful period of strong growth.

The vital problem is how to raise the average level of efficiency within the industry while tariffs and negotiated agreements still give some protection. Justifiably you may call upon a tardy Government for realistic help, national and international, in sharing the burden of the uncontrolled flood of textiles from "low cost" countries. Competition from

* *Abstract of a paper given at the recent Cotton Board Conference.*

† *A director of Courtaulds Ltd.*

European and other highly industrialised producers is another matter. The trickle of European goods that came into this country in the early 50's has now been joined by American goods since the liberalisation of dollar trade. Whether we join the Common Market or not the pattern of our foreign trade will swing more and more in the direction of Europe. In this the activities of the trading community are already running ahead of their Governments and even in textiles the trend is already visible in the statistics.

My own firm's recent experience may introduce an optimistic note. Our exports of fabrics this year are running marginally a fraction higher than last year, but the change in ratios between markets is very significant. Last year the Commonwealth took four times as much as Western Europe; in the last six months the ratio has swung to 1·6:1; our trade with the Common Market countries has trebled without any tariff changes at all. From Europe we have competition which no one can justifiably call unfair or based on rice-bowl wages. We also have a potential export market far greater than we can say realistically is open to us today elsewhere.

I believe that a business with interests in several vertical stages in textiles will be better informed, more flexible and more progressive in outlook than a firm, however well run, which is limited in its activities to one stage only of the chain.

Second, that there are still far too many people in the industry living on the backs of the productive staff and workpeople and the consuming public, with the result that overhead and distribution costs are higher than they should or need be. We hear a lot of talk about labour and machinery productivity, these days and I wish more attention was directed to improving the productivity of management and of distribution.

Competition

Before looking more closely at the structure of the industry, I would like to give definitions of three types of competition—healthy, wasteful and chronic. The first, I define as competition which forces relatively inefficient methods whether in production or selling to be discarded so that the average level of efficiency rises *at least* in line with our foreign competitors. Wasteful competition is competition which results in a high proportion of new investment being idle—perhaps as now in the motor industry. Chronic competition is the competition caused by long-term surplus of capacity, usually due to a continuous decline in demand; this leads to such low prices and so saps morale that it removes the incentive to invest capital in new fixed assets, thus stopping the technical developments that are just what is needed to revive the industry. The latter which has dogged Lancashire in the last ten years.

There are two lines of attack here. First, elimination of the tail of low-efficiency units and second, the improvement of the already reasonably efficient. The first will be hastened but not completely achieved by price competition. The second—improvements in efficiency of the better firms might be assisted by mergers of which there have been a few in the U.K. We all pay lip service to the need for greater rationalisation but far too little is done about it. Other industries have demonstrated both the need and its practicability, not least the rayon producing industry itself. With small units there are fewer jobs to attract the right calibre of professional management and less room for adopting the techniques of sales promotion and market research which are so necessary today. I am, therefore, an exponent of the need for large units but I would not like you to think that I am sounding the death knell of the small firms. For specialised production undoubtedly such units have much to offer: indeed the fibre producers often find the smaller firms the most eager to press on with new developments. It is for the "bread and butter" lines for the mass market that the large firms must be pre-eminent. There are already 70 to 80 U.K. firms who between them control four-fifths of the spinning, about 40% of the weaving and the bulk of the finishing. Rationalisation resulting from mergers within this group could be the most effective way of improving the U.K's prospect in a combined European market.

Scrapping and Re-equipment

The improvement that has to take place in machine utilisation is substantial. As I see it, it is only the certainty of maximum utilisation of machinery that can justify the investment in new equipment without which costs and selling prices cannot be reduced.

How is this to be achieved? High on the list I would put the continued scrapping of surplus capacity technically obsolete. Much has been achieved by the Government's reorganisation scheme but mine is not the first voice to suggest that it did not go far enough. The Government scheme left the industry with some 147,000 looms (102,000 non-automatic): between 1957 and 1959 production fell from 2,300 mn. linear yards to 1,900 mn. linear yards. 2,000 mn. linear yards may, therefore, be a reasonable starting point estimate of annual production. Assuming two shifts as standard, 124,000 looms would be required; on three shifts (112 hours per week) 85,000 looms. Re-equipment with modern automatic looms of higher speeds and greater efficiency moreover would further reduce the number necessary for a given output. I know some people are still unconvinced about the cost saving involved in automatic weaving and three shift work and they may be sceptical about the policy I am advocating. I give some facts from my own company's weaving operations admittedly based mainly on filament yarn but still recorded as part of the cotton industry in most official statistics.

By the time our re-equipment is finished next spring we shall have reduced the number of weaving mills formerly owned by Courtaulds and British Celanese from 9 to 4: our looms will have been reduced from a post-war peak of 4,000 to 1,900. But 90% of our looms will be automatic and they will be running an average of 115 hours per week instead of 49½ in 1947. The result of this is an increase in productivity per head of more than 2½ times in 14 years which surely speaks for itself. However, we are still dissatisfied and must continue to struggle for further economies.

Surplus capacity is not easily removed. One reason is that fluctuations in production make it seem attractive to keep machinery in the hope that the opportunity may recur for its re-use at some time. Certain firms may also find it worthwhile to employ their looms even though the fabrics produced sell at a price no greater than the direct cost of production while they wait for trade to improve. This situation removes the incentive for firms to re-equip and is an important cause of the lack of confidence throughout the industry. What is required is a more permanent "market" for idle capacity with the price for scrapped looms and spindles sufficiently high to make it more desirable to scrap than to retain the excess.

We cannot realistically expect more financial help from the Government, and compensation for firms scrapping plant and for displaced workers will have to be found within the industry: this should be raised by levy on machinery in place. This levy, which would need statutory backing to make it workable, appears at first sight to lay a heavy burden on those remaining in operation. Nevertheless although the incidence of the levy might increase as the number of machines falls, if those remaining are used efficiently the cost to the industry would be small and the effect less than the erosion of prices and confidence arising from excess capacity.

Calculations have been made which show that with payments similar to those in the recent reorganisation scheme the levy might be such as to add one or two tenths of a penny per yard to fabric costs. I do not think that such a scheme need involve complicated administrative procedures. It does require estimating annually the demand on the industry allowing for general trading conditions, stock movements and the nett effect of likely imports and exports.

As I see it, all firms would be required to make returns showing the number of machines installed, the hours normally worked and changes planned in the coming twelve months. This would show the potential supply, measurement of which against estimated demand would indicate the apparent surplus loom and spindle hours. A levy to apply to existing machinery would then be fixed, this levy being calculated to yield sufficient to give scrappage payments on looms withdrawn in the following years plus redundancy payments, on a scale thought to be large enough to persuade withdrawals from the industry. Individual firms' decisions would be helped by the publication of the underlying review and forecast by the administering authority. Such an operation would be repeated each year. In this way, what would have been a long drawn out process of adaptation to future market and technical conditions will be speeded up; in addition, the end result will probably be an industry of greater efficiency.

Organisational Aspects

The past year has seen steady developments in the concentration of trade organisations and I particularly welcome the linking of associations representing the users of man-made fibres and cotton in research, and in spinning and weaving. I am certain that the new organisations are on lines which promise well for the future. I am equally sure that nothing but good can come from the continued affiliation of the appropriate sections of the new Associations and the British Man-Made Fibres Federation. The Federation, indeed, is one of the few vertically organised Trade Associations in the industry and is in a strategic position for fostering closer co-operation between those who make and those who use the different fibres.

(*Continued on page 496*)

Features and Efficiency of the "Onemack" Shuttleless Loom

Designed specifically for the manufacture of hessian, sacking, tarpaulin, etc., this recent machine is also suitable for weaving sisal and other hard fibre yarns in the corresponding fabric range. It is also being used with notable success to weave a wide range of fabric weights from glass rove

By S. A. G. CALDWELL, F.T.I.

THE search for greater efficiency in performance has resulted in many modifications in design of the standard straight reed loom. These have been directed mostly to automatic renewal of the weft supply package, and so have failed to eliminate the fundamental defects of the shuttle method of weft insertion. This has been mainly responsible for recent revolutionary changes in loom design which employ other means for weft insertion.

Disadvantages of shuttle-operated looms include limited rate of operation of the shuttle mechanism, high maintenance cost due to wear and tear with the need for frequent adjustment and renewal. Also, the production of a specially wound weft package of relatively small capacity adds considerably to the cost of preparation, while requiring frequent renewal during the weaving process. Nevertheless, while the shuttle operated straight reed loom is wasteful of energy, costly to maintain and operate, the fact that it is still the principal medium for woven cloth production emphasises the problems relative to development of other means of weft insertion. That these have been solved is evidenced from the range of shuttleless looms now available, and their tardy adoption throughout the industry stems rather from aversion to break with tradition than from any recognised defect in performance.

The advantage—and disadvantage—of the old Lancashire type loom was its adaptability for the production of a wide range of fabric weights and types. In an era of cheap labour its limitations were less obvious, being offset by skilful manipulation which, however, resulted in low operative output. High labour costs have made it an uneconomic proposition despite its low capital charge. The requirements of a modern weaving unit vary with the conditions in which it is required to function. In old established centres of manufacture possessing a highly skilled and highly paid labour force emphasis is on quality and production per man hour. In new centres of industry depending mainly on unskilled labour or, at best, semi-skilled workers, emphasis is essentially on trouble-free performance with minimum attention. The problem for the loom maker is to design a machine which will meet these requirements.

While the modern shuttle-operated automatic loom is capable of fulfilling the first mentioned conditions maximum performance cannot be assured in the hands of unskilled workers. Regular tuning by skilled labour is necessary to ensure trouble-free running. This work is concerned mainly with timing and maintenance of the three primary mechanisms for shedding, picking and beating up. Any modification in design which dispenses with this specialised service will contribute materially to a solution of the problems of adaptability and cost of production.

Competitive Factors

The limitations of the orthodox straight reed loom have been felt most keenly by the jute industry in the manufacture of packaging materials—hessian, sacking, etc. The growing competition from non-woven wrappings, and the impetus given to alternative methods of transport by bulk handling following the upward trend of raw jute values has emphasised the need for economies in conversion cost to restore the competitive position of the industry in this sphere. The direct weaving cost, excluding yarn preparation, is the most expensive item in this department of manufacture, representing approximately 25% of the total with shuttle-operated looms, and including yarn preparation, over one-third of the entire conversion

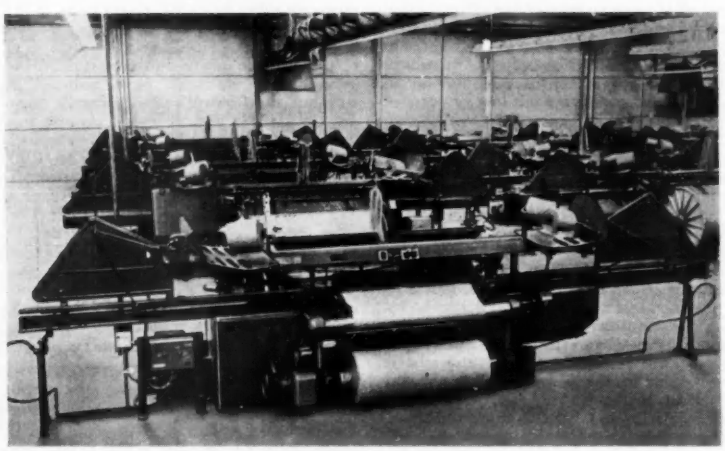


Fig. 1. End-to-end view from the front of the "Onemack" shuttleless loom

cost. The weaving section consequently provides scope for economies which could contribute materially to a solution of the industry's economic problems.

The modern automatic loom is a precision machine, capable of high performance on materials which it is designed to weave. The limited adaptability of any model is offset by the production economies obtainable. In the manufacture of simple structure fabrics such as hessian and sacking the problem of adaptability does not normally arise, so that a high degree of standardisation is possible throughout the installation. Where this consists of shuttleless looms which dispense with the need for a special weft winding section a further substantial saving in manufacturing cost is possible.

The "Onemack" shuttleless loom shown in Fig. 1, is made by James Mackie and Sons Ltd., Belfast. It was designed to meet the specific requirements of the jute industry in the manufacture of hessian, sacking and tarpaulin. It is also suitable for weaving sisal and other hard fibre yarns in the corresponding fabric range, and its versatility extends to the glass fibre industry in which it is being used with notable success to weave a wide range of fabric weights from glass rove. Although only a few years on the market its merits of trouble-free operation and low cost production have ensured a considerable and expanding demand, over two thousand five hundred being now in operation throughout the world.

Weft Supply

In the "Onemack" loom the weft is inserted by two spears, one on either side. Each withdraws its yarn supply from a large size stationary roll package mounted on the loom frame. The weft stands accommodate two rolls, which are wound with a tag end so that they can be joined in sequence to ensure continuity of supply. The rolls are similar to those used for the warp beam creel so that the same form of winding unit is suitable for both warp and weft packaging. This permits economies in space and in capital investment in the winding department.

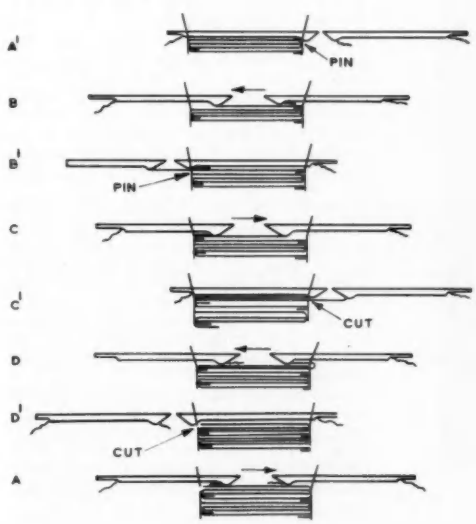
The sequence of movements of the spears to insert the weft in the shed and subsequently position it in the fell of the cloth is indicated in Fig. 2, which shows also the stages at which pinning and cutting take place. At *A'* the left-hand spear *X* moves across the shed, the blade shoulder pressing home the previous pick, which has been inserted during withdrawal by the right-hand spear *Y*. During withdrawal by *X*, indicated at *B'*, it lays a weft thread which is pressed home by *Y* as it traverses the shed and lays on the return journey. The left-hand spear re-enters, as shown at *C*, pressing home the previous pick and laying as it crosses the shed, indicated at *C'*. At the end of its traverse the weft is cut at the right side selvedge. At *D* the left-hand spear is being withdrawn and is followed up by the right-hand spear travelling in the succeeding shed, pressing home and laying in turn. At the left-hand selvedge the weft is cut and the spear withdraws without laying. It will be seen that the functions of the spears are reciprocal, laying and pressing home—equivalent to picking and beating up on the shuttle-operated loom—in turn.

Weft Cutting

The pin and cut mechanisms which are located at each side of the cloth fell hold and cut the weft laid by the spears to form single picks in the shed, the pin holding and the knife cutting the weft on alternate strokes of the spears in single pick cloth construction. When weaving double pick cloths the cutting motion is dispensed with as the spear lays on both outgoing and return journeys. The spear clamp cams and weft detector cams used in single pick weaving are replaced by those suitable for double pick weaving when changing over.

The length of cut at the selvedge and of the trailing end from the spear, the latter determining the extent of the turned in portion at the selvedge, is regulated by a cam and a clamp within the spear head which functions to ensure the tension for cutting, remaining closed until the weft is to be laid again. The pin and cut mechanism pins on the right-hand side of the cloth as indicated in Fig. 2, then on the left-hand side. This is followed by pin and cut on the right-hand side and pin and cut on the left-hand side to complete the sequence.

The spears are constructed of Stellite mounted on a high density wood backing, highly polished to eliminate risk of damage to the warp. The points are designed to ensure free passage through the shed. During their movement across the loom both spears travel in the same direction at any time, being operated by a common crank *A* through a series of chains, as indicated in Fig. 3. The reciprocating motion is consequent on the sliding movement imparted to the primary chain sprockets *B* and *C*. It is possible also to weave double shots in plain weave or twill, thereby eliminating cutting of the weft and production of heavier selvedges consequent on folding in one cut end. This principle of weft insertion permits the use of heavy yarns in the warp and light yarns in the weft in sacking fabrics.



(left) Fig. 2. Sequence of movements of spears inserting weft in the shed

(below) Fig. 3. The crank and chain arrangement for operating the spears

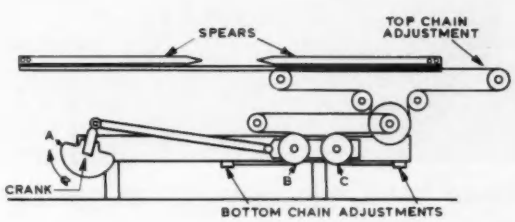


Table 1.

Model	Weave	Loom state cloth width	Max. picks per min.
SA ..	Plain 1 × 1	21 - 31 in. (53·3 - 78·7 cms.)	220
	Twill 2 × 1	21 - 30 „ (53·3 - 76·2 „)	220
SA38 ..	Plain 1 × 1	22 - 38 „ (55·9 - 96·5 „)	215
	Twill 2 × 1	22 - 38 „ (55·9 - 96·5 „)	215
SB ..	Plain 1 × 1	34 - 49 „ (86·4 - 124·5 „)	200
	Twill 2 × 1	34 - 47 „ (86·4 - 119·4 „)	200
SC ..	Plain 1 × 1	49 - 66 „ (124·5 - 167·6 „)	160
	Twill 2 × 1	49 - 63 „ (124·5 - 160 „)	160
For Weaving Glass Rove			**Picks per min.**
SB ..	Plain 1 × 1	34 - 49 in. (86 - 124 cms.)	190/195
	Twill 2 × 1	34 - 49 „ (86 - 124 „)	190/195
SC ..	Plain 1 × 1	49 - 60 „ (124 - 152 „)	165/170
	Twill 2 × 1	49 - 60 „ (124 - 152 „)	165/170
SD ..	Plain 2 × 2	60 - 84 „ (152 - 214 „)	135/140
	Twill 3 × 1	60 - 84 „ (152 - 214 „)	135/140

While traversing the warp both spears move in different sheds, the change over being effected between the retreating and advancing points. This is made possible by the sectional construction of the shedding motion, and results in a wave effect being imparted to the movement of the heald wires when the loom is in operation. The two-and-two selvedge shedding motion changes half the number of times that the main shedding motion changes. This arrangement binds the weft thread laid by the spear on the same side.

Shedding, Let-Off and Take-Up

The shallow shed, approximately 2 in. deep, and the means employed to position the weft in the fell of the cloth impose practically no strain on the yarns during weaving. This results in a tension free, and consequently stronger, fabric than could normally be produced on the conventional loom, while the method of selvedge formation eliminates the main object to fabric production on looms of this type, and is certainly no obstacle in the case of the materials the "Onemack" loom is designed to weave.

The warp let-off and cloth take-up motions are of conventional type, the former being negative chain friction, and the latter the ratchet take-up type. Warp and weft stop motions are fitted. These are linked up with an electric control panel on which warning lights indicate the cause of a stoppage.

An important feature of the "Onemack" loom is the ease of access to all parts of the mechanism for setting and servicing. Elimination of the complicated shuttle mechanism and the moving sley dispense with the need for constant tuning. Once the loom is set for the requirements of the fabric to be woven little further attention is necessary beyond renewal of the large capacity weft packages and the repair of occasional end breaks. One weaver can supervise 8 - 12 looms, depending on operative efficiency. Trouble-free running makes the "Onemack" loom an attractive proposition in new centres of industry.

Yarn preparation for looming is effected in the usual manner, bearing in mind the fact that, as with other types of automatic loom, trouble-free running is mainly dependent on effective warp and weft preparation to ensure uniformly tensioned and well-built beams and packages. The use of pre-beamed loom beams is recommended to reduce risk of run out ends. Weft packages should be free from loose yarn and cobwebbed ends, the size recommended being 9 or 10 in. traverse, by 9 in. dia., as produced on the Mackroll winder shown in Fig. 4.

The "Onemack" loom is built in four sizes to weave jute and hard fibres, and three sizes are available for weaving glass rove. Details and speeds are set out in Table 1.

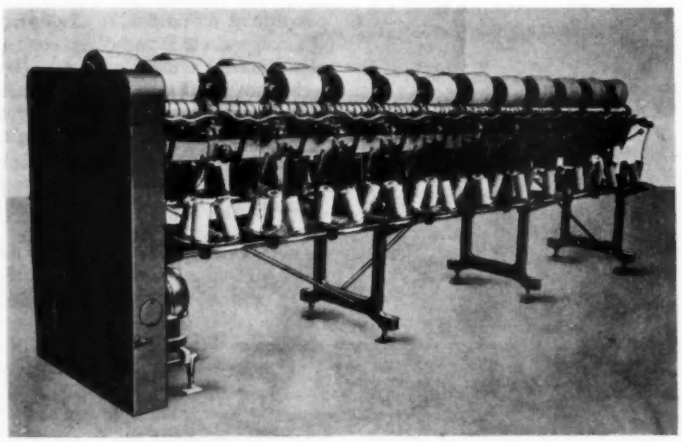


Fig. 4. The Mackroll winding machine which will produce 9 or 10 in. traverse by 9 in. dia. packages for the "Onemack" loom

Relationship of the Man-Made Fibres Industry

(*Continued from page 493*)

The apex of Lancashire's industrial organisation, the Cotton Board, is a Development Council under the 1947 Industrial Organisation Act and you are now the only industry to retain such a Council. In so far as the abandonment of such bodies has been regarded as a mark of sturdy independence Lancashire has, perhaps, given an impression of weakness to the outside world which is unjustified. It may indeed have been a psychological deterent to the earlier formation of closer links with the users of man-made fibres. The Cotton Board for its part has in my view been the victim of the too wide ranging terms of reference bestowed upon it under the Act. There is a very real function for a body of this kind in implementing the type of scheme I have outlined for further rationalisation and enabling the industry to be strongly represented in negotiations with the Government. In both functions the Board has already demonstrated its skill.

Finally, where does the man-made fibres industry fit into this structure. I have already welcomed the linking of trade associations of users and I agree with those who advocate participation in the counsels of the Cotton Board or its successor: in this I am happy to echo the thoughts expressed by Lord Rochdale in his speech last year. But this must, as in the case of the Associations, be on the understanding that the users of other fibres than cotton are treated as vigorous partners, a vital section of the textile industry working on the cotton system, not as junior members "to be seen and not heard."

I would emphasise the words "users of man-made fibres." The man-made fibre producers stand in the same relation to the rest of the textile industry as the suppliers of cotton and wool. The major difference lies in the fact that man-made fibres are made in factories and not grown on farms. It would be quite inappropriate for the producers to become closely integrated into the present type of Cotton Board. Their customers are spread throughout the textile industry—and outside. At the same time, the moment is fast coming when the whole textile industry will have to give very serious consideration to the possible creation of a Council composed of all U.K. textile interests.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

Ultra-High Speed Production of Crimped Yarns

This recently developed machine is designed to operate within the speed range 200,000 to 300,000 r.p.m., producing up to 6 lb. take-up packages. It has transistorised heater units and temperature control

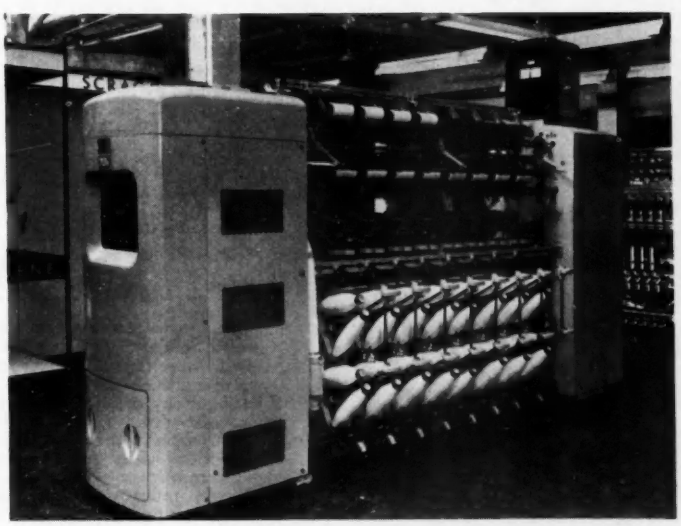
THE production of crimped yarns at ultra-high speeds is of interest only if the highest quality standards can be maintained, and if the higher through-put rate is combined with a reduction in the labour cost per pound of yarn produced. With these important factors in mind the design team of the Scragg Group undertook three years' intensive development work, a research activity which culminated recently with the announcement of the C.S.9 Crimper designed to operate within the speed range from 200,000 to 300,000 r.p.m., producing up to 6 lb. take-up package cheese.

Two of the critical problems in the pursuit of high speed in false-twisting are heat setting and twist insertion. Effective heat setting involves penetration down to the core of the yarn itself—to a threshold temperature which is not far removed from the melting point of the yarn; only then can the required molecular re-orientation take place. This condition is a function of the exposure period, the yarn denier, and the temperature differential during passage of the yarn through the heater.

Serious thermodynamic problems have to be solved to provide practical and effective solutions to these problems. Lengthening the heaters is not the simple answer; and the simple appearance of the new C.S.9 heaters conceals a time/temperature relationship which is the fruit of months of calculation and patient experiments.

Effective twist-locking during false-twisting is a complex technology in itself. A close study of the operational parameters resulted in the precision input and output yarn feed system and yarn tension control successfully developed for the C.S.1, 2 and 3 series. But these machines had limitations and in five years reached the limit of development, although speeds were progressively increased from 30,000 r.p.m. to 80,000 r.p.m., an average increase of 10,000 r.p.m. per year.

This latest machine—the C.S.9—while bearing the series designation of its predecessors is, however, a completely fresh design from top to bottom. According to the makers, it is expected that the C.S.9 will provide the highest quality yarn at the lowest possible cost to the producer and, it is tated, offers the yarn processing trades new standards of economy in performance and practice unequalled by any other crimp yarn system currently available or expected to become available during the next few years.



The standard C.S.9 is built in sections of 188 "Spinflote" spinners with 94 spinners at each side

Construction

The standard C.S.9 machine is built in sections of 188 "Spinflote" spinners with 94 spinners at each side, mounted in twin-units. Of a radically new design, the "Spinflote" spinners are twin-unit assemblies providing simultaneous production of "S" and "Z" twist yarn, using a new principle of cushioned precision drive. The specially designed twisting heads incorporate super-hard yarn twisting surfaces. Each unit is independently enclosed and all bearings are lubricated for life. The twin-assembly is controlled by a single lever for stopping and starting. In addition to the standard arrangement which provides adjacent "S" and "Z" twist, the spinners can, of course, be adjusted to run all "S" or all "Z."

Transistorised Heater Units and Temperature Control

The entirely new patented 24-in. twin yarn path heaters are designed to give rapid penetration with uniform setting temperature to all deniers of yarn at ultra-high speeds. Each heater is supplied with current through its own individual transistorised electronic thermostat, consequently ensuring that the exact temperature value is always maintained.

The heater thermostat outputs are collectively regulated by a single master temperature source, itself adjusted to the required temperature value by a single setting knob. Individual heater temperatures can be maintained with the highest possible accuracy, regardless of the yarn count passing through the heater or external conditions. The current supply is through a saturable reactor at each thermostat. It is particularly interesting to note that there are no moving parts, and no relay contacts to wear and be replaced—the system is entirely electronic. Access to each heater is by a full-length door providing quick-threading and easy cleaning. This completely new quality control system is the heart of the C.S.9, complementing the "Spinflote" spinners to ensure ultra-high quality yarn at optimum speeds.

Monitoring System

Mounted on the main end-frame, the monitoring system consists of an automatic scanning unit to which the individual thermo-couples in each heater are automatically compared in turn. As each heater is checked, rotary indicators display the number of the individual heater, and a pointer indicates any deviation from the nominal temperature.

Yarn Feed Control

The extension-control method is used to maintain constant processing tension values. After passing through a small stabiliser disc the yarn length is thereafter controlled by two sets of nip rollers, one set below the heater and the other set above the spinner unit. The relative surface speeds of the driving rollers can be quickly adjusted in increments of 1%. The nip roller of each set is covered in synthetic rubber, precision surface-ground to fine limits. Since the driving rollers are on a common shaft, no spindle-to-spindle variations are possible.

Take-up Packages

These are arranged in two tiers to provide single-end cheeses of up to 6 lb. capacity, built on paper tubes. The tubes are fitted on mandrels carried in fibre-bushed light alloy cradles. To facilitate yarn handling, each cradle can be held in the "off" position during doffing by a trip lever. The twin-tier system, in addition to producing single-end cheeses, also permits assembly-wound packages of "S" and "Z" yarns to be produced, and follows original C.S. practice in affording maximum operational flexibility.

Pneumatic System

A notable Scragg development in false-twist practice, the pneumatic system removes monomer gas and vapours from the heaters, and permits easy yarn handling during threading-up and doffing. The removal of monomer gas and carbonised spin-finish is obtained by a system of special collectors fitted immediately above the heating zone. These exhaust monomer gas and surplus hot air which would otherwise be dissipated into the atmosphere to the detriment of room temperature and working conditions. Provision is also made in the extraction system to collect any liquid condensate from the waste gases. The extraction system may discharge to the outside air, or through filters; a flange above the machine connects to the user's own ducting.

A second duct is fitted along the machine below the first tier of take-up packages, and is used to collect the yarn during threading up, even at the highest throughput speeds, the collected waste being stored in a box at the end of the machine. The pneumatic control system also enables the large packages to be doffed without breaking down the yarn in the processing zone. Power for the pneumatic system is provided by a built-in fan.

A specially manufactured endless belt provides maximum flexibility and driving power under all conditions. Even at the highest spinner speeds the belt speed is extremely low, so ensuring the longest possible life.

High-Speed Traverse and Gearing Unit

Of the new Scragg "70's" type, this is a totally enclosed unit mounted in a main gear casing incorporating a dry sump. The unit is precision-built as a separate assembly and includes a heavy duty precision-machined grooved cam, complete with pattern breaking mechanism. To ensure reliability and mechanical efficiency the main gear case is provided with an integral automatic lubrication system for all moving parts and bearings operated by a built-in rotary pump.

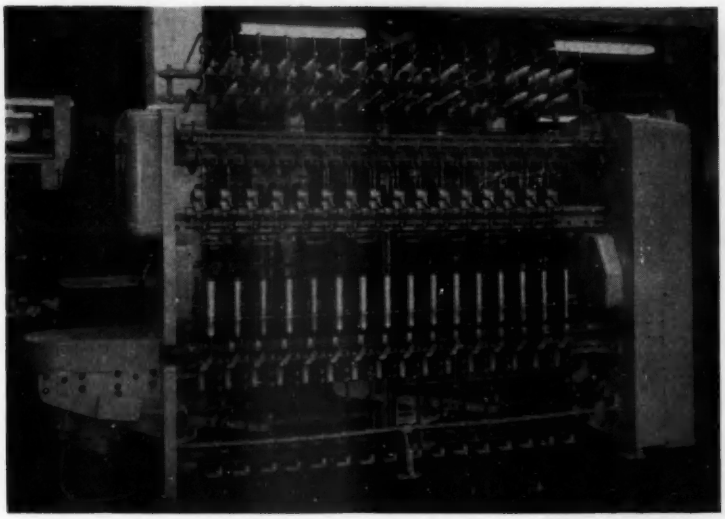
Narrow-Width Worsted Doubler

Of special interest to the worsted trade, the new Scragg "70's" ring doubler and twister (the D.L.W.) is a narrow-width machine designed to give high twist regularity combined with high production efficiency. A single, large diameter feed roller with a high-friction surface finish provides accurate yarn throughout control.

A new twin rotary servo-mechanism combined with positive braking of the feed roller makes the stop motion action virtually instantaneous, and ensures against the production of "singles" yarn. Single-end knotting can be maintained despite the high yarn throughput speed, giving increased doubling efficiency and ensuring the high standards of quality essential to the worsted doubling industry.

The standard machine, supplied with 160 spindles, 3-in. dia. section rings, has a 9-in. lift, and operates at up to 8,000 r.p.m. Bottle bobbin, double-taper pirn or parallel doubler package build can be obtained.

Incorporating many new features, the D.L.W. machine utilises an entirely new yarn stop motion system operated by twin rotary servo-mechanisms which instantly



The Scragg "70's" D.L.W. worsted ring doubler

disengages both feed roller and spindle in the event of an end breakage, whilst automatic brakes stop feed roller and spindle to prevent "over-running." In addition, a secondary stop motion operates in the event of a breakage in the plied yarn zone. "Singling" or "false-doubling" is virtually eliminated, state the makers, and re-engagement of feed roller and spindle is by a foot-pedal control.

A single large diameter feed roller provided with a special high friction surface is employed. The internal brake, operated by the stop-motion upon disengagement of the feed roller, releases automatically after engagement to facilitate re-threading. In this way maximum production and fatigue-free operating efficiency is coupled with the processing of high-quality yarn of consistently reproducible standards.

Close attention to detail has resulted in improvements to secondary motions. The hinged balloon guide lappets traverse with the ring, thereby minimising yarn tension variations. Self-lubricated rings are fitted as standard with either $1\frac{1}{16}$- or $1\frac{1}{8}$-in. sections.

Heavy-duty roller bearing spindles of advanced type are fitted, incorporating the latest Scragg anti-vibration suspension system. Spindle separators are provided as standard equipment. An entirely new heavy duty double-cam traverse mechanism unit is fitted, giving smooth high-speed reciprocation to the ring rails. Particular attention has been paid to this new traverse mechanism, which is, of course, very important in any ring doubling machine. This, Scragg's latest type, is intended to form the basis of a range of ring doubling machines.

The main drive is taken from the motor through an endless belt driving the spindles and gearing mechanism. The motor is mounted on a three-point suspension which also provides automatic belt tensioning. A combined starting and reversing switch is standard equipment. Ball or roller bearings are used throughout the main bevel gear unit and twist gearing. Independent twist gears to each side can be fitted if required.

Standard creel equipment is for two ends from revolving packages, with a reverse bobbin peg. The number of ends can be increased to suit individual requirements. Provision is also made to withdraw over-end from large packages if required. In keeping with the new design concept, contour-styled, one-piece moulded fibre-glass guards are provided, while magnetically-mounted panels afford quick access for maintenance and inspection.

High Burning Rate Chain Grate Stoker

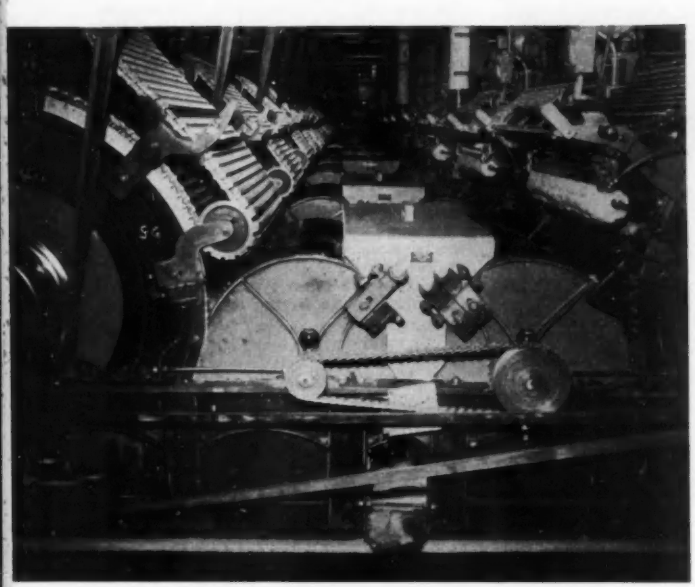
IN line with their policy of continuous development Bennis Combustion Ltd. now announce the introduction of the Bennis Mark V chain grate stoker. This machine, production of which is running concurrently with the Mark IV, has been specially designed for applications where high burning rates are required. It incorporates a new thin link giving the high air to metal ratio necessary for efficient combustion and cooling the grate under these conditions. A system of internal baffles replaces the integrate damper, simplifying operation and regulating accurately the air supply to all sections of the grate.

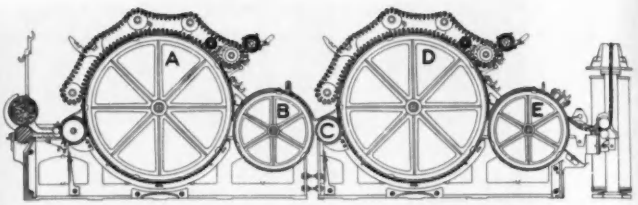
A large fuel hopper substantially manufactured from steel plates is provided for each grate and is fitted with a hinged front door. Hopper and door extend the full width of the grate and the door can be easily raised to give access to the interior for inspection or hand-firing purposes.

The grate speed is variable to suit various classes of fuel and conditions of firing. Each unit is driven by a $\frac{1}{3}$ h.p. geared motor with suitable starter. The motor could be a.c. with a 90 sec. timer for intermittent operation, or it may be designed for d.c. in which case there is a suitable controller and rectifier. The drive from the motor is by roller chain through worm gearing running in an oil bath and totally enclosed in a dustproof case.

One high efficiency fan is supplied for each grate and is coupled direct to the driving motor. Dependant on the size of grate, the fan supplied is suitable for a duty of 3,000 c.f.m. at 2·50″ w.g. running at 1,440 r.p.m.; 3,500 c.f.m. at 3·50″ w.g. running at 2,850 r.p.m., or 4,000 c.f.m. at 4·00″ w.g. running at 2,870 r.p.m. respectively.

Bennis Mark V chain grate stokers fitted to a Lancashire boiler at the Asquith Bottom Dyeworks, Sowerby Bridge





(above) The Duo Card using transfer cylinders of different diameters, i.e. doffer to licker-in. A—breaker carding cylinder. B—first transfer cylinder. C—second transfer cylinder. D—finisher carding cylinder. E—doffer

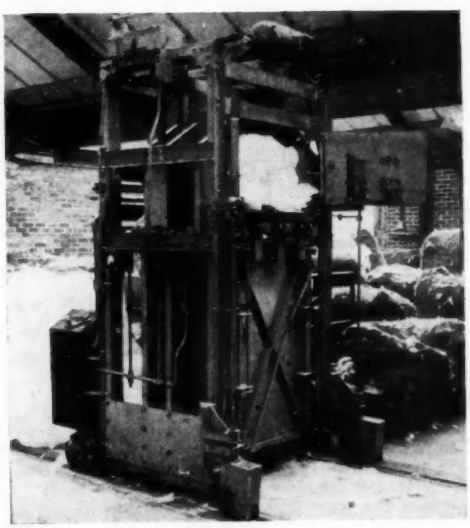
left) Duo Card System using transfer cylinders of same diameter

New Cotton Carding System

SACO-LOWELL Shops of Easley, S.C., U.S.A., have entered into an agreement with Swift Spinning Mills' Columbus, Ga., for world-wide merchandising rights on the new DuoCard system which may revolutionise carding methods employed in the textile industry today.

Illustrated herewith is the new DuoCard system recently announced by the Swift Spinning Mills, Inc., Columbus, Ga. In this system, two conventional cards are altered by removing the front delivery section of one card back to the doffer. The licker-in on the second card is replaced by a doffer which provides continuous high-speed transfer of the carded fibres to the second cylinder. There a finished carding action is given to the fibres before they are replaced in sliver form. Results of mill operation are claimed to confirm that the potential of the revolutionary system is extremely broad in that the benefits are not confined to increased production alone; but also include up-grading quality, reduction in waste and the possibility of utilising cheaper raw materials.

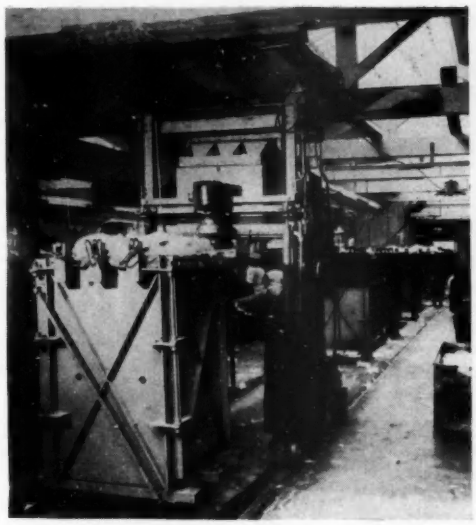
Press for Wool or Man-Made Fibres



In this view, the cavity between the top of the bin and the compression plate has been filled ready for compression. The press will not, however, operate until the door has been closed

MANUFACTURED by Bidex Engineering Co. Ltd., Fleece Mills, Keighley, Yorks., the press shown here was designed primarily to bale man-made fibres produced continuously from a number of processing machines on the same floor. Before mechanical baling was introduced, a frame from which the bale covers were suspended, was situated at the end of each processing machine. The operator gathered the material as it was produced and inserted it into the bale covers and then trod the material to increase density. The problem was to produce a machine to compress the bales at each filling point and cut out manual treading. It was planned to design a single press which would traverse the whole length of the room, some 120 ft. in length, and straddle a series of filling bins positioned at each processing machine. The traverse of the Press is along steel rails set into the floor. Power was obtained from the mains through a spring loaded cable drum, which was fixed to the roof supports mid-way between the extreme filling points. Bins to hold the bale covers were situated along the room at the various filling points and between the rails. These are robustly constructed to withstand the pressure and are supported by four spring-loaded feet fixed to the floor. The sides of the bin have provision to expand when the door is opened to allow easy withdrawal of the finished bale. Standard colonial covers may be used, and these are suspended in the bins on quick-release spikes along the top edge. The lid of the bale is fixed to the cover on one side so that only three sides have to be fastened when sealing the bale.

As material is produced by each machine the respective bin is filled as far as possible without pressing, after this the press is used. The press is moved over the fixed



This picture shows the press immediately after it has moved away from the filling bin. All controls and motors are self-contained in the machine

bin by pushbutton control and located by means of a lever motion, until this lever is operated the pressing motion cannot be used, and after engagement the machine cannot be traversed. One side of the press opens and this provides a cavity between the top of the fixed bin and the compression plate. The material is stuffed into this, the door is closed, and the contents are compressed into the bottom bin, rods are pushed through rollers over the compressed material in the fixed bin, and the press is moved along to repeat the operation on another bin.

In this manner the machine is continually moving along the floor from bin to bin as needed. When sufficient material has been packed into the bale, the lid of the cover is drawn over the rods retaining the material and fastened either by means of skewers, fish hooks, or sewing, the rods are then removed and the bale released from the bin. During the pressing operation no additional load is brought to bear on the floor as the press and the bin become one unit. All conflicting mechanisms are interlocked, and the pushbutton control panel with centralised controls is fixed to the side of the machine. Traverse along the floor is by a motor driving through a fluid coupling which ensures smooths tarting and stopping. Power is transmitted to two of the traction wheels. To ensure the operator is always in full control, all mechanisms stop as soon as his finger leaves the particular push-button. In this particular instance the lines had to be curved in one place to enable the press to negotiate a fixed obstruction.

Aerosol Cutting, etc. Lubricant Reaches Difficult Spots

WELL-KNOWN for their highly efficient range of specialised lubricants in industry, Rocol Ltd., Swillington, Leeds, recently announced their latest addition, the R.T.D. spray. This is an aerosol form of Rocol R.T.D. compound, an extremely effective cutting lubricant originally introduced for reaming, tapping and drilling and now used extensively for difficult operations on all materials.

Development of R.T.D. spray enables the compound to be applied "at the touch of a button," a unique method for this type of lubricant. Introduced because of its ease and handiness, the spray has been found to have many technical advantages, especially for application in die-boxes, penetration down flutes of tools, covering of forming tools and dies and for following moving work-pieces. It eliminates the messiness of a brush and pot and is of advantage in all machines not fitted with a suds pump and reservoir. There must be innumerable applications for this in the maintenance sections of all textile mills, factories and machinery manufacturing concerns. The illustration shows the spray being used with a die-box.

New Publications

EXPORTER'S GUIDE TO THE WOOL TEXTILE MARKETS OF THE WORLD. National Wool Textile Export Corporation, Commerce House, Bradford 1.

The British wool textile industry regularly exports to more than 150 countries, ranging from leading markets such as the U.S.A., Canada and West Germany to tiny places like Lichtenstein, Mauritius and the Windward Isles. The latest count shows that the industry sells tops to 57 overseas markets, yarn to 116, woollen and worsted cloth to 151 and blankets to 105 countries. Together these sales earn on average £160 million a year in foreign currency. This publication, compiled by Mr. G. Richardson, gives data in condensed form on trade in wool textiles with 50 of Britain's largest overseas markets. It also contains tables showing total exports of tops, yarn and cloth to many other countries not covered in detail because they are relatively less important or, like China and Egypt, because they are important only as markets for tops. Thus, the new edition is, in effect, a complete guide to the world's wool textile markets.

BRITISH CHEMICALS AND THEIR MANUFACTURERS (1961). Association of British Chemical Manufacturers, Cecil Chambers, 86 Strand, London, W.C.2.

Published at two-yearly intervals, this valuable reference work is available free to all firms or persons genuinely interested in the purchasing of chemicals and related products. The first section lists members with a key group letter or letters according to the products manufactured. Other sections are (*a*) directory of members, (*b*) a classified list of British chemical products, (*c*) a classified list of indicators and microscopical stains, (*d*) lists of proprietary trade names and trade marks.

Indicating and Recording Instrument Range

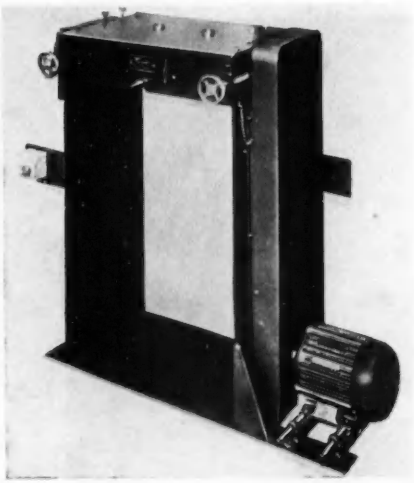
THE elapsed time indicators, manufactured by Cass and Phillip Ltd., Mark Road, Adeyfield, Hemel Hempstead, Herts., are used in all branches of industry to indicate and record total operating time of all types of machines and equipment, and, after considerable research, a new type has now been introduced which is of particular interest to engineers concerned with problems involving wide voltage fluctuations. This instrument incorporates a voltage stabilising system based on a Zener diode.

The elapsed time indicator mechanism is operated by a 6 volt d.c. supply at 30 mA $\pm$ 10% instantaneous and the voltage stabilising system ensures this voltage is maintained to the operating coil within tolerances, in spite of wide fluctuations in the supply voltage. To give an example of the voltage stabilisation which can be achieved, the indicator will operate satisfactorily at voltages varying between 16 and 30 volt on a nominal 24 volt d.c. supply.

An instant starting and stopping device is incorporated and the complete mechanism including the gear train is suspended on four leaf springs spaced on 90° arcs. The mechanism is then inserted in a polythene case, the leaf springs being located in grooves moulded in the case. This assembly is then installed in a steel outer case and electrical contact is made through insulated terminals in the rear. Instruments are available, if required, fitted into a cast aluminium case complete with protective front cover and anti-vibration mountings according to type of application and requirements of the user.

Elapsed time-indicator enclosed in metal case with anti-vibration mountings

New Hank Unwinding Machine Has Wide Range



AN investigation by time and motion study experts, indicating that a machine produced specifically for hank unwinding would be invaluable to recombers and slubbing dyers, has resulted in the development by James Holdsworth and Sons (Halifax) Ltd., New Bank, Halifax, of a new machine designed to greatly facilitate unwinding operations.

Robustly constructed in steel, it has a V-belt drive, and is totally enclosed. The rollers are ground and mounted in cast-iron bearings and the single motor has twin stop-and-start switches so that operators can work from either side, thus making it possible to fill two cans at the same time. The manufacturers claim that this compact double-sided machine gives twice the production, or alternatively saves half the normal floor space.

The machine is simple to operate and maintain and, because of the great variation in the sizes of cans now being used, special care has been taken to design a machine that will accept a universal range of types and sizes.

Trade Literature

"FRED'S" (FOR RESOLVING ENDLESS DIFFICULTIES) 'ARD AT IT. This bright folder is actually a special engineering supplement to "M.S. News," published by Midland Silicones Ltd., 68 Knightsbridge, London, S.W.1. Fred is a practical chap, possessing a wealth of specialised know-how about the many engineering applications of silicones. The supplement gives concise information on the wide range of M.S. products which are, or can be, used by engineers today. These include silicone electrical insulants, silicone-coated paper and unvulcanised rubber, silicone-based paints, non-melting silicone lubricants, silicone rubber extrusions in a wide range of shapes and profiles, and "Dri-Sil" silicone masonry treatments.

* * *

PHOBOTEX FT AND PHOBOTEX FTS. Circular No. 2176, issued by Ciba Ltd., Basle, Switzerland, gives valuable information and many recipes for using these two products. Based on melamine resins, they are designed to give durable, wash-fast water-repellent finishes on natural and man-made fibres. Advantages cited by the manufacturers include (*a*) excellent water-repellency, (*b*) the finishes withstand repeated laundering with soap and soda, (*c*) no washing-off, (*d*) pleasant, soft to full handle depending on concentration used, (*e*) no effect on air-permeability of treated fabrics, (*f*) very stable impregnation baths.

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MOLYBDENUM DISULPHIDE IN ACTION. Published by K. S. Paul (Molybdenum Disulphide) Ltd., Angel Lodge Laboratories and Works, Angel Road, London, N.18, this is the second edition of a booklet first published in 1959. The new issue contains a number of new reports on applications of Molybdenum Disulphide, but also retains many of those published in the first edition. Copies are available on request to all engineers interested in solid lubrication.

THE TEXTILE
COLOURIST & FINISHER

New Facts About Fibres and Their Properties

Properties and possibilities of polypropylene fibres and modified types, dyeing techniques, etc., also developments in spin-dyeing polyvinyl chloride and polyamide fibres, and new methods for bleaching acrylic fibres in woven and knitted forms

By B. C. M. DORSET

RECENT news that I.C.I. Ltd. had obtained a licence to manufacture polyolefine (more particularly polypropylene) fibres in Britain using the production methods (with improvements) developed by the Montecatini company in Italy and the intimation that these new synthetic fibres should be available early in 1962 gives some indication of the importance attached to such fibres. Although it is anticipated that a first use for these cheap-to-produce, lighter-than-water fibres will be for ropes and twines it can confidently be expected that their use in other sections of the textile industry will follow rapidly.

It has been possible for many years to polymerise the olefines obtainable from petroleum residues and also from the natural gases which are associated with crude petroleum deposits but not to control the polymerisation sufficiently to ensure the formation of linear rather than branched polymers. It will be recalled that only linear polymers are useful for the manufacture of textile fibres. But with the discovery of special catalysts by the Italian chemists Montecatini and von Natti which can direct the way in which the molecules of ethylene, propylene, and other similar olefines add on to each other there is now no difficulty in polymerising these olefines to obtain a high proportion of linear polymers which can ultimately be melt-spun into fibres having the high degree of crystallinity which goes with high tensile strength.

These new polyolefine fibres have a compact molecular structure and are strongly hydrophobic as in fact is to be expected since their chemical composition is closely similar to that of a paraffin wax. From this viewpoint they have most of the physical properties desired in a textile fibre except that they are difficult to dye. At present, polyolefine fibres are being produced spun-dyed, i.e., the colouring matters are introduced into the fibre-forming polymer before extrusion in fibre form. There are limitations, of course, to this method of producing coloured fabrics and garments made from polyolefine fibres and so developments are progressing to prepare modified fibres which can be dyed by much the same methods as used for cotton, wool, and other fibres.

Considerable attention is now being given to the production of polypropylene fibres the raw material being mono-meric propylene having the formula given in Fig. 1 so that the

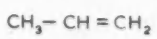


Fig. 1

linear molecules of the fibres have the structure shown in Fig. 2. At present

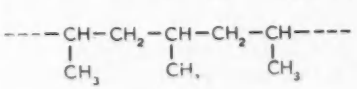


Fig. 2

manufactured by a melt-spinning technique which includes a "drawing" of the freshly formed fibres, the main physical properties of the commercial fibres are as follows:—

(1) **Tensile strength, 5 g./den. and higher**
(2) **Extensibility, 30%**
(3) **Specific Gravity 0·9**
(4) **Softening point, 280 F.**
(5) **Highly resistant to most acids, alkalis, cold (but not hot) organic solvents, mildew and moth.**
(6) **Somewhat sensitive to deterioration in sunlight but this defect can be partly removed by incorporating suitable protective substances in the fibres.**
(7) **Burns slowly.**
(8) **Undesirably inert towards dyes so that the fibres have but little affinity for dyes.**
(9) **Moisture regain, 0%.**

For polypropylene fibres to be useful in the textile industry for the production of fabrics it is necessary to modify them in the direction of making them more hydrophile. This would enable them to absorb moisture, as for example perspiration, but it would not necessarily give them a sufficiently increased affinity for the dyes now in common use. To enable polypropylene fibres to be conveniently and satisfactorily dyed it appears necessary also to introduce into them atomic groupings having dye attractive properties. Such groups should be basic or acid in character for in this way the fibres could be given dyeing properties comparable to those of wool.

One early favoured method for giving them an increased affinity for dyes consisted of grafting on the chain molecules of which the fibres are composed other polymeric chains derived from a monomer which has dye attractive properties. It has been found that an iso-propenyl-pyridine (optionally substituted by a methyl group in the heterocyclic ring) gives polypropylene fibres a degree of basicity which allows them to be dyed with acid wool dyes. Thus polypropylene staple fibre grafted (B.P. 872,432) with 3-iso-propenyl-pyridine and methylmethacrylate so as to gain 7% in weight or grafted with 2-iso-propenyl-pyridine and styrene so as to gain about 4·5% in weight acquire good dyeing properties.

An alternative method of improving the dyeing properties of polypropylene fibres is to add a suitable dye attractive substance to the fibre-forming polypropylene and then extrude the mixture to give substantially homogeneous fibres (B.P. 866,920). It is not strictly necessary that the added substance should be dye-attractive for, if its presence has the effect of separating the polypropylene chain molecules so as to give the fibres a more open structure, then this facilitates the entry of dye particles into them and can actually make the fibres receptive to dyes not normally possible. Thus, while the basic 3-iso-propenyl-pyridine utilised described above can give the polypropylene fibres a definite affinity for acid wool dyes the co-presence of inert substance such as methylmethacrylate gives the fibres a looser structure to assist penetration of the fibres during dyeing of the acid dyes applied.

Epoxy resins are suitable substances for mixing with polypropylene before extrusion to form fibres since their presence gives such fibres a useful affinity for disperse dyes. The preferred epoxy resins are condensation products of epichlorohydrins with bis-phenols such as 4:4′-dihydroxy-diphenyl-dimethylmethane. Thus, polypropylene fibres which can be dyed with disperse yellow, red, violet and black dyes are obtained by mixing 90 parts of a linear highly crystalline polypropylene with 10 parts of an epoxy resin made by condensing epichlorohydrin with 4:4′-dihydroxy-diphenyl-dimethyl-methane and having the formula given in Fig. 3 and then extruding the molten mixed polymer at 250°C., the resulting fibres being then hot-stretched to 4½ times their original length. In the dyeing it

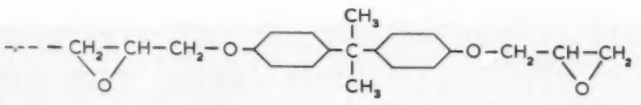


Fig. 3

is not necessary to raise the temperature of the dyebath beyond 100°C. and yet secure really deep shades fast to rubbing.

It is an interesting fact that the above modified polypropylene fibres have a higher moisture absorption as shown by the moisture regains at 50%, 80% and 100% R.H.

	% Moisture Absorption	
% R.H.	Ordinary Fibres	Modified Fibres
50	1·1	1·1
80	2·9	3·1
100	3·3	7·2

The presence of the epoxy component in the polypropylene fibres thus makes them more hydrophile and this would induce them to swell to an increased degree in the dye liquor and so allow a more easy penetration by the applied disperse dyes.

A further improvement in such modified polypropylene fibres is to after-treat with an amine such as hexamethylene diamine and then cure at 100°C. In this curing stage the diamine acts as a catalyst in converting the epoxy compound into a less soluble resin. With such changes the fibres acquire greater affinity for dyes while improving the solvent resistance and the dimensional stability of the fibres. Alternatively, the epoxy compounds may be esterified with oleic or linoleic acid before being mixed with the polypropylene for extrusion of the fibres.

Further particulars for improving the dyeing properties of polypropylene fibres are given in B.P. 873,830 by mixing with the polypropylene before extrusion into fibres of up to 15% of selected water-insoluble polymers which can be readily emulsified with the molten polypropylene and which have a molecular weight of the order of 1,000. Quite a large number of such modifying polymers are available and useful and they include polyalkylenimines, polyester resins, polyamides, polyurethanes, polyureas, and polyalkylenimine-epoxy resins. A particularly useful point is that by thus improving the dyeing properties a remarkable improvement in the stability of the fibres towards ultra-violet light is simultaneously obtained. The following example of thus modifying polypropylene fibres with a polyethylenimine-epoxy resin is of special interest.

The epoxy resin is first produced by condensing epichlorohydrin with 4:4′-dioxydiphenyldimethyl-methane melted with mono-ethanolamine for 25 mins. and then polyethylenimine is added with stirring. Then one part of the product is mixed with nine parts of polypropylene and the mixture is melt-extruded at 220°C. to give fibres (after stretching) which can be dyed with many acid wool dyes such as Wool Red B, Alizarine Blue SE, and Fast Light Yellow 2G as well as some disperse dyes such as Cibacet Red B and Eastman Yellow 2R. The increased hydrophile character of the fibres is indicated by the following moisture regain data:—

	% Moisture Regain	
% R.H.	Ordinary Fibres	Modified Fibres
50	1·1	1·8
80	2·9	3·6
100	3·3	43·5

These modified fibres have improved stability to ultra-violet light arising from the 10% of polyethylenimine-epoxy resin mixture present within them, but this stability can yet be further improved by a subsequent treatment in which the fibres are boiled for 10 min. in a 5% aqueous solution of formaldehyde. Incidentally it may be noted here that ordinary polypropylene fibres are considerably more deteriorated than polyamide (nylon) fibres during exposure to light. The curves in Fig. 4 show this difference between the light stability of polypropylene and nylon fibres, also how the polypropylene fibres can be improved in this respect by modification with the polyethylenimine-epoxy resin and yet further be improved by the formaldehyde after-treatment.

In connection with these difficulties associated with the dyeing of polypropylene fibres and the methods for overcoming them by suitably modifying the composition of the fibres it is interesting to notice a recent discovery in Germany (B.P. 838,687) that certain disperse dyes have a useful affinity for polypropylene fibres when applied by conventional methods. This indicates that the dyeing difficulties might be solved by making special dyes rather than by modifying the polypropylene fibres.

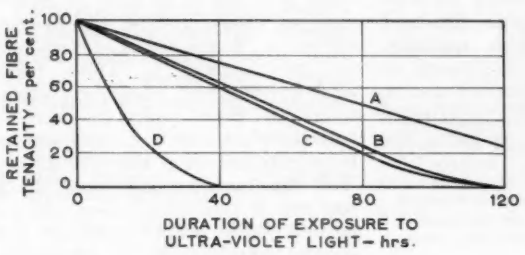


Fig. 4. Curves for (A) ordinary nylon 6,6 fibres, (B) fibres made from polypropylene + a polyethylenimine-epoxy resin and after treated with formaldyhyde, (C) as (B) but not formaldehyde after treated, and (D) ordinary polypropylene fibres

Those dyes now found to dye polypropylene fibres under ordinary conditions are monoazo dyes in which the benzene or other aromatic nucleus is substituted by a radical consisting of a straight or branched aliphatic alkyl group having not less than seven carbon atoms. An example of such a dye is that made by coupling beta-naphthol with diazotised para-amino-octylbenzene having the formula shown in Fig. 5. Polypropylene fibres can be dyed in an aqueous dispersion of this dye containing a non-ionic dispersing agent and so secure a bright yellow dyeing having good fastness properties. It would appear that part of the resaon for such dyes being able to dye polypropylene (also other polyolefine) fibres is that the long aliphatic carbon chain gives them a high degree of hydrophobicity.

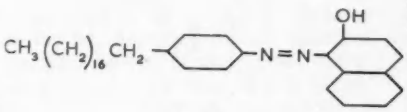


Fig. 6

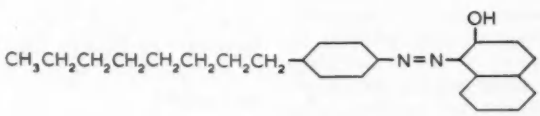


Fig. 5

A similar dye to that described above can be made by coupling beta-naphthol with diazotised octadecyl-aniline. It has the formula shown in Fig. 6 and gives bright yellowish red shades.

Using this type of dye it is also possible to form it within the polypropylene fibres by first applying the coupling component, say para-nonylphenol and then applying the diazotised amine, say para-cetyl-aniline. A deep golden brown colour is produced with these components and it merely remains to hot soap the dyed material to remove any loosely adhering dye.

Polyethylene Terephthalate Fibres

Although it is now possible to dye polyester fibres in a wide range of shades by using dyeing methods in which the dyeing temperature exceeds 100° C. or by dyeing in the presence of a dye-carrier it would be much better if this type of synthetic fibre could be dyed by the conventional methods in conventional dyeing machines. This possibility could arise from a modification of the polyester fibres either by melt spinning polyethylene terephthalate pre-mixed with a substance able to confer hydrophile properties or capable of giving the fibres an affinity for acid wool dyes somewhat after the manner in which it is now being attempted to improve the dyeing properties of polypropylene fibres previously described.

One attempt in this direction consisted of adding a minor proportion of an amino alcohol to the polyethylene terephthalate but although this expedient certainly gave the fibres an increased capacity to absorb disperse and acid wool dyes, a serious snag was then encountered—the heat stability of the fibres was impaired. In another attempt long chain polyalkylene oxides having a molecular weight of 1000 to 6000 were similarly used, but then it was found that the polyethylene terephthalate fibres became highly sensitive to light and aerial oxidation so as to deteriorate rapidly under such conditions of exposure.

It has recently been discovered (B.P. 876,534) that improved dyeing properties can be obtained without the disadvantages attached to the previous methods by forming a modified polyethylene terephthalate so that it contains up to one mole of a dialkylene mono-sulphone diester co-polymerised with three moles of the polyethylene terephthalate. Dimethyl-6:6-sulphonyl dicaproate, dimethyl-5:5′-sulphonyl-divalerate, and dimethyl-4:4′-sulphonyl- dibutyrate are suitable sulphones for this purpose. By this modification the molecules of the resulting fibres will consist of recurring ethylene terephthalate groups having the formula shown in Fig. 7. interspersed with a smaller number (say not more than ⅓rd) of

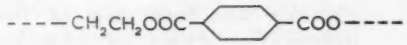


Fig. 7

sulphone-containing groups having the formula in Fig. 8. in which *R* represents an alkylene radical.

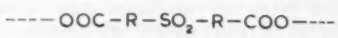


Fig. 8

The increase of dyeing affinity thus obtained is roughly proportioned to the amount of the sulphone compound in the polyethylene terephthalate but it has been found that it also lowers the softening temperature of the fibres. Thus it is generally necessary to restrict the increase of dye affinity to a degree which does not unduly lower the softening temperature. However, it is possible to modify the polyester fibres so that they can be dyed under ordinary dyeing conditions to yield deep shades and yet without appreciably impairing any other properties of the fibres.

In preparing these modified polyethylene terephthalates it is quite satisfactory to heat together a mixture of ethylene glycol, dimethyl terephthalate, and the dialkylene mono-sulphonyl diester at an initial temperature of say 165°C. and finally at 250 to 260°C. or even higher to complete the reaction. In a typical process 38 parts of dimethyl terephthalate, 60 parts of ethylene glycol and 4·8 parts of dimethyl-6:6′-sulphonyl-dicaproate are heated together. The fibres melt-spun from the resulting modified polyethylene terephthalate can be cold-drawn and they then have excellent physical properties as well as a good affinity for dyes such as acid wool and disperse dyes. It is possible for the

modified fibres to absorb, under ordinary dyeing conditions, nearly three times as much dye as would non-modified fibres.

An alternative method for producing coloured fibres is to add a colouring matter to the spinning melt or solution so that the extruded fibres are directly coloured. There are limitations to this method but it has to be adopted whenever the difficulties attending ordinary dyeing are exceptional. For example, this so-called spin-dyeing is used for polyvinyl chloride and polyethylene terephthalate fibres and even for polyamide fibres. Hitherto mainly inorganic pigments have been used for this purpose since they give fast colourings and are sufficiently stable to withstand the high temperatures used in melt spinning processes yet they have relative low tinctorial strength. A large proportion of organic pigments and dyes decompose under fibre-spinning conditions but notable exceptions are copper phthalocyanine and chlorinated copper phthalocyanine dyes—these do not decompose even at the high temperatures employed for spinning polyamide and polyester fibres.

Recently it has been found in Switzerland (B.P. 875,039) that certain indigo and thioindigo dyes have a high degree of stability at high temperatures and these have now been put to use in spin-dyeing polyamide and polyester fibres. These special dyes conform to the general formulae given in Fig. 9 in which A^1 and A^2 represent arylene residues free from groups which impart water-solubility, and R represents an aryl residue also free from such groups. Such dyes (1) can be made by condensing an indigo compound with an arylacetic acid halide (such as phenylacetyl chloride). In using these dyes it is found most satisfactory and convenient to dust the finely ground or precipitated (from sulphuric acid solution)

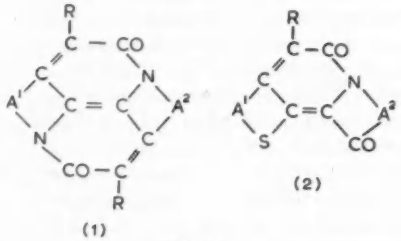


Fig. 9

dye over the fibre-forming polymer in the form of granules or chips and then melt these for melt spinning.

By using a mixture of 99 parts of polyhexamethylene adipamide and 1 part of the red dye having the formula given in Fig. 10, and spinning the

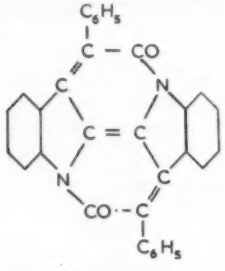


Fig. 10

resulting melt at 290 to 295°C. there results fibres having a brilliant red shade of good fastness. Alternatively the polyamide may be replaced by polyethylene terephthalate and then by spinning the melt fast red coloured polyester fibres can be produced.

Organic Synthetic Fibres

Glass fibres have the valuable properties of a very high tenacity (6·3 to 6·7 g./den.) and a high initial modulus (resistence to stretching) of about 330 g./den. in addition to being flameproof so that today they have found many uses in which, so far, they cannot be replaced with equal satisfaction by ordinary textile fibres. Yet obviously if synthetic fibres could be produced to have the above mentioned useful characteristics of glass fibres and yet retain their normal useful resistance to flexing, then they could advantageously take the place of glass fibres. From B.P. 876,491 it would appear that E. I. du Pont de Nemours and Co., have been working on this problem and have now succeeded in establishing conditions whereby certain types of polyamide, polyurea, and some other fibre-forming polymers can be spun to give fibres having much the same high tensile strength and initial modulus as glass fibres and additionally a high desirable resistance to flexing. Success has come from the use of linear synthetic polymers which have recurring units in their long chain molecules comprising cyclic groups connected by functional linkages and such polymers are also characterised in having a glass-transition temperature of at least 180°C., and an initial sonic modulus of at least 50 grams/den. as determined on the as-spun fibres (i.e., before the customary cold or hot "drawing"). These fibres after drawing with consequent orientation of their molecules have a tenacity of at least 9 g./den. and an initial modulus of at least 180 g./den. The fibre-forming polymers which conform to this specification may be termed "stiff chain" polymers on account of the relative inflexibility of their long chain molecules. To produce the desired fibres having glass-fibre characteristics these special "stiff chain" polymers are drawn in fibre form while this is substantially in an amorphous state at a temperature above its glass-transition temperature and below its melting temperature—the glass-transition temperature is that at which the polymer markedly changes its properties as its temperature is steadily raised and it is usually just below the temperature at which the polymer crystallises.

Thus the production of organic polymer fibres having properties of glass-fibres depends on the choice of a suitable fibre-forming polymer (its suitability is decided by its glass-transition temperature and also by its high sonic modulus) and the extrusion of this into filaments which are finally given the desired properties by a process of hot-drawing under conditions which allow the chain molecules to become highly oriented in the direction of the fibre length (at least 60 to 70% such orientation is required) before a substantial degree of crystallisation takes place. The production of such fibres can be briefly outlined by the following example.

The fibre-forming polymer is first made by co-polymerising in dimethylformamide solution at 70 to 100°C. a 2/1 mixture of diphenylene-4:4′-di-iso-cyanate and 2:5-dimethylpiperazine. The product after removal of occluded air is then ready for spinning downwards through a cell in which there is an upward current of hot air entering at 250°C. and cooling to 190°C. in the region of the spinnerette. By such a dry spinning process fibres are obtained having the following characteristics:—

(1) Tenacity	**2·13 g./den.**
(2) Extensibility	**36%**
(3) Initial modulus ..	**52 g./den.**
(4) Glass-transition temperature	**250°C.**
(5) Sonic modulus ..	**72 g./den.**

These as-spun fibres have obviously but a low tenacity. But when they are then hot-drawn at 285°C. to 1·8 times their original length they acquire the following improved characteristics:

(1) Tenacity	9·9 g./den.
(2) Extensibility	5·2 %
(3) Initial modulus ..	291 g./den.
(4) Molecular orientation	81%

and in this state are considered to be comparable to glass fibres in respect of their tenacity and initial modulus but markedly superior in respect of their high resistance to flexing and flexing-abrasion. Further, the fibres have a moisture regain comparable to that of silk and cotton fibres. If they are exposed to a temperature of 118°C. for 48 hours their tenacity and extensibility are reduced by only 10% and 6% respectively, while the initial modulus increases slightly. The new fibres generally have a density below 1·3 compared with that of glass fibres whose density is 2·5.

It is again pointed out that success in spinning these new organic polymer fibres comparable in their properties to glass fibres but without the defects of the latter can only be obtained by using a suitable "stiff-chain" fibre-forming polymer, that is, one which in the as-spun fibre state has a sonic modulus of at least 50 g./den. and a glass-transition temperature not below 180°C. Many polymers now available and in commercial use for making fibres and plastics do not have these characteristics and so cannot be used for the production of the glass-like fibres and Tables 1 and 2 illustrate this point.

Bleaching Acrylic Fibres

Acrylic fibres, i.e., those made from a polymer or co-polymer prepared so as to contain at least 85% of acrylonitrile, are usually somewhat off-white when freshly made and, in general, fabrics made from such fibres are difficult to bleach to a good white. It has furthermore been found that in any steaming treatment concerned with dyeing or finishing the acrylic fibres tend to become yellower so that it could be extremely useful to have available a method for protecting such materials from this type of discolouration. B.P. 872,281 discloses a French discovery which makes it possible now to bleach acrylic fibres to a good white such that it is not thereafter subject to the defect of discolouring during steaming.

The new method consists of impregnating the textile material with a liquor containing sodium chlorate (the special function of this substance is to liberate under acid conditions chloric acid) and an acid or acid-liberating compound such as sulphuric, phosphoric, or a sulphonic acid, or an acid salt such as aluminium sulphate. Sodium and potassium chlorates are preferred since they are cheap. If it is required to produce a good white or unbleached material then the impregnating liquor should contain 100 to 200 g. of chlorate per litre and up to 300 g. of the acid per litre, but if the treatment is simply to prevent yellowing during steaming then only about one-tenth of these amounts are required.

Commencing with unbleached acrylic fibre fabric it is possible to give this a good stable white by impregnating it with a liquor containing 150 g./litre of aluminium chlorate and 50 c.c./litre of sulphuric acid of 66° Bé, then centrifuge to give a liquor pick-up of 85%, dry at 35°C., and then steam at 120°C. for 15 mins. when it is finally washed with cold water. An alternative treatment for the same purpose is similarly carried out but using an impregnating liquor consisting of 200 g./litre of sodium chlorate and 100 c.c./litre of phosphoric acid of 53° Bé.

White knitted fabric, for example, can be made resistant to yellowing in steaming by impregnation with the following liquor containing 5 g./litre of sodium chlorate and 5 c.c. litre of phosphoric acid of 53° Bé., and then centrifuging to give a liquor pick-up of 70%, so that it can then be dried at 30°C. and steamed at 130° for 5 mins. These whitening treatments can be applied to acrylic fibre fabrics also containing other fibres such as polyester and cellulose triacetate fibres.

Table 1

Polymers Not Suitable for Producing Glass-like Fibres

Polymer	Sonic Modulus g./den.	Glass-transition Temperature °C.
Nylon 6	18	40
Nylon 6,6	21	50
Polyacrylonitrile	25	73
Polyamide from 2:5-dimethyl-piperazine and adipic acid	36	90
Polyethylene terephthalate	24	68

Table 2

Polymers Suitable for Producing Glass-like Fibres

Polymer	Sonic Modulus g./den.	Glass-transition Temperature °C.
Polyamide from meta-phenylene diamine and iso-phthalic acid	51	273
Polyamide from tetramethyl piperazine and 3:3′-dimethyl-4:4′-di-isocyanato-diphenylamine	60	190
Polyamide from 2:5-dimethyl-N, N-diamino-piperazine and iso-phthalic acid	61	244
2:5-dimethylpiperazine and 3:3′-dimethyl-4:4′-di-isocyanato-diphenylene	84	205

New Fire Extinguishers

THE photograph shows two fire extinguishers from a new range introduced by Valor Co. Ltd., Erdington, Birmingham. That on the left is the Foamera foam extinguisher, Type E8, for Class "B" risks. Available in two sizes, with 1- or 2-gallon capacities, it is for use on vehicles, rolling stocks, ships and motor boats, etc. It has a copper inner container and a double locking device which seals both inner and outer containers and prevents premature discharge. Giving

a 30 ft. jet, the 2-gallon size generates more than ten times its capacity in foam.

The other, the Gas-water extinguisher, Type E9, is for Class "A" risks with a 2-gallon capacity and is suitable for use on furnishings and delicate fabrics. Capable of simple and rapid operation, it can be easily recharged, and has a nozzle and hose extension for directing to awkward positions with a 30 - 40 ft. jet. Both extinguishers have casings of lead-coated steel, hot-dipped in tin-lead alloy after manufacture to give double protection from corrosion.

Front and rear views of the latest Shirley loom equipped with a re-designed positive dobby using paper pattern control in place of lags and pegs

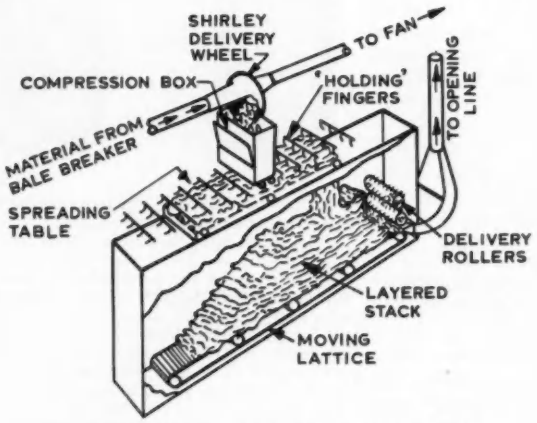
Results of Vigorous Research Policies

Some of the recent developments on view to visitors at the recent annual meeting of the Cotton, Silk and Man-Made Fibres Research Association

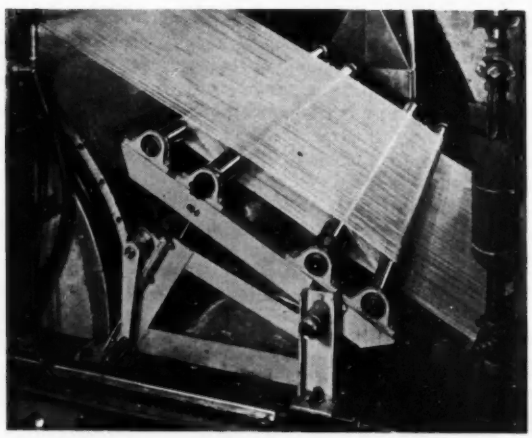
Work in the field of condenser spinning had involved fundamental studies of yarn quality and its relation to fibre properties and methods of processing, and of the origin and where possible the prevention, of periodic variations in the products, as well as more immediately practical work such as comparative studies of existing and new machines—of special value to members who were envisaging changes involving re-equipment—and developments of existing machines such as the substitution of an electrostatic fancy for the mechanical fancy on breaker or finisher cards.

Work for doublers and, indeed, all work on yarns from the spindle point to the sizing process had been transferred to a new Yarn Processing Department. The four-fold preventer had been re-designed in a rigid arm form and had worked satisfactorily in trials. It was being produced in moulded plastic and arrangements had been made for the manufacture of 1,000 units, for which orders already existed. This would provide an extensive mill assessment of the new design. Work on the density of wound packages had continued and should prove of value in the problem of dye uptake variation caused by variation in package density.

In the sizing room were shown the results of some experiments on a new method of fibre laying in sized warps. This was an extension of work on the self-brushing of warps which had also been continued to the point where the latest model of the attachment was available commercially.



A schematic diagram of the Shirley sandwich blender



Shirley self-brushing sizing attachment in routine use in a mill

Shirley roller vibration analyser

Work on loom mechanisms, said Dr. Hill, especially as they were affected by the demands for high speeds, were illustrated by the Shirley loom now available as a single shuttle or as 2 × 1 box loom and by the work done with British Northrop Ltd. on picking and checking motions. The Shirley loom was now fitted with a redesigned positive dobby using a paper pattern control. The dobby operated at high speeds was running at 210 p.p.m.

Work had continued on the fluidised bed which was already in commercial operation for the heat stretching of tyre cords and which showed considerable promise in other directions where the rapid application of dry heat at a uniform temperature was desirable. Notable among these, and being actively pursued at present was the dyeing of fabrics from synthetic fibres such as nylon or "Terylene" where the only major technical problem remaining was the application of the dye liquor in suitable form and suitable quantity, and to the heat treatment of bulked yarns at high speed where the technical problems had been largely solved.

Chlorite bleaching, becoming increasingly important, had been the subject of much work at the Institute in recent years. They had established conditions for its use under non-corrosive and non-poisonous conditions and had investigated the use of activators of different kinds, with the result that a new method of activating chlorite permitting the use of a cold pad method for chlorite bleaching had been established. This was particularly valuable for blends including fibres sensitive to the more normal vigorous bleaching processes.

Fibre Blends

The programme of work on fabrics from blended fibres had reached the stage where the Institute could expect to be able to forecast most of the properties of such fabrics from a knowledge of the behaviour of the individual fibres. From now on, therefore, it would be necessary only to work on the individual properties of yarns and fabrics from 100% single fibre form. Over a wide field, Shirley could give considerable help to people who wanted to produce a fabric that has some particular functional behaviour—or alternatively, which was just as useful, to say that it could not be done.

Experimental investigations had covered various two component blends of cotton, nylon "Terylene", "Acrilan", "Tricel", viscose, in singles and two-fold yarn spun in a range of twist factors. The cloths woven from these yarns had all been plain square constructions. The advantages to be gained from blending lie in the possibility of securing combinations of properties not to be had from single fibres.

When the proportions of two fibres in a blend are altered in steps to give a series of fabrics, it is found that each of the properties varies in an orderly, though often non-uniform, manner. The simplest kind of variation is illustrated by the graph on page 510. Pleats set in Tanguis/nylon blend cloths by heat were subjected to four different treatments A, B, C and D, that tended to remove them. The angle of the crease, as determined after the treatment, is a measure of the retentivity of the cloth for pleats. The results for the blends all fall fairly close to a straight line connecting the results for the single-fibre fabrics.

Sandwich Blending

Visitors greatly appreciated the opportunity to see many of the recent developments in the laboratories, engineering and experimental departments. They saw the Shirley sandwich blender designed to recover as much as possible the lost blending resulting from the omission of stack blending in modern operating lines. The machine has several features. It is automatic in operation. It can also be located at any convenient place in, or near to, the opening department. Built on unit construction principles, it can be made any reasonable length to give a size of stack to suit individual conditions. The machine can also be used for laying a stack on the floor. Hargreaves, Hamilton and Co. (Engineers) Ltd., Bolton, Lancs, manufacture the blender under licence from Shirley Developments Ltd.

Roller Vibration

One of most recent developments is the roller vibration analyser. Periodic thick and thin places in yarn are often due to the presence of torsional oscillations in the slow moving rollers of a speedframe. It is important to measure the amplitude as well as the frequency in order to be able to diagnose whether they are likely to give rise to serious irregularity in the yarn. The vibration analyser is a portable, battery-operated instrument which provides an immediate indication on a meter of the percentage peak amplitude as well as the fundamental frequency of any oscillations in the roller under test. It is a fully transistorised unit of small dimensions with self-contained power supplies using rechargeable batteries. This makes it very suitable for use in mills since it enables rapid spot checks on speedframe rollers to be carried out on a routine basis so that serious yarn defects arising from this can be eliminated. Vibration in the roller is detected by a precision tacho-generator which may be hand-held on the roller for rapid checks, but which is preferably more solidly mounted for accurate measurements. The signal from the tacho-generator is then analysed by the transistor circuits in the electronic unit. A single control knob switches the circuitry successively to standardise the instrument and then to measure amplitude and frequency. Test positions on the switch are also provided to check the state of the internal batteries and also to enable the frequency calibration to be verified. A recharging unit is supplied to enable the batteries to be periodically recharged from the mains.

Another notable development is the Manra Vee pirn, the purpose of which is to avoid sloughing-off without using high winding tensions. The pirn can be used for almost any type of filament or spun yarn but should be used on flat filament yarns only after preliminary trials. Use of the pirn is most beneficial with filament yarns liable to be over-stretched by high winding tension and giving rise to diamond barring.

CUT HERE

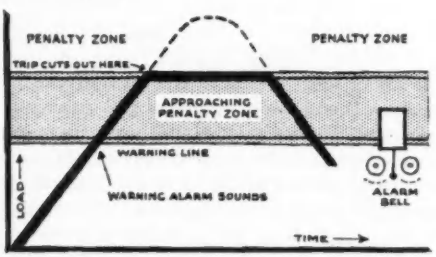
Load Factor Improvement

Most industrial electricity tariffs consist of a fixed charge based on the maximum demand for electricity by the works and a running charge for each unit (kWh) of electricity used. Broadly speaking, the fixed charge covers the capital cost of generating, transmitting and distributing equipment for the particular demand and the running charge covers the cost of generating the units.

Thus, if the factory maximum demand is reduced for the same level of consumption or is held constant for an increased consumption, the cost per unit will be reduced. This is termed improving the 'load factor': load factor being defined as the ratio of the number of units supplied during a given period to the number of units that would have been supplied had the maximum demand been maintained throughout the period; it is usually expressed as a percentage. Some ways in which load factor can be improved are:

SUPERVISION AND CONTROL OF MAXIMUM DEMAND

A maximum-demand alarm gives a warning when the maximum demand is about to be exceeded. One of the simplest devices has two warning contacts, but, as a useful addition, an auxiliary relay can be supplied so that non-essential load can be tripped automatically.



The Load Limiter, an automatic device, meets the requirements of medium and large consumers who wish not only to control their system loading to some target maximum but also to improve the load factor in order to increase the overall economy of the plant.

EXAMPLES OF REDUCTION IN MAXIMUM DEMAND

Broadly speaking, loads which contain some storage element can be transferred from on-peak to off-peak times. Examples are: charging electric batteries used in industrial trucks and road vehicles; pumping loads in drainage schemes; water pumping in quarries, gravel pits and other open-air workings; large cold-storage warehouses; ice-making factories in which cost of power is a sufficiently large item of the operating expense to make a reduced charge acceptable.

Many processes at times of peak demand can, under controlled conditions, tolerate a temporary reduction, or even cessation, of supply without any serious effect on the product. With electro-chemical processes such as in the manufacture of hydrogen peroxide no difficulty arises from periodic interruptions at short or even no notice.

In a plastics factory the management arranged for dies to be switched on by time switches one after another early Monday morning so at the beginning of work all dies had reached their operating temperatures. Previously they were switched on more or less simultaneously by hand when work started, resulting in an abnormally high demand.

In a certain chemical works compressed air is used for blowing out containers for plastic material. The nature of this operation is such that the consumption of air is spasmodic and irregular. The demand-recording meter in this works showed that the 18-kilowatt motor driving the air compressor was frequently cutting in on top of the factory load, thus incurring a higher maximum-demand charge. In this case all that was necessary was to ensure that the air receiver only required charging at night-time or at other off-peak times. It was found that the existing receiver had such a small capacity that the pump had to operate to recharge it almost every time the blowing operation took place. This small receiver was therefore replaced by a receiver of large enough capacity to maintain the blowing requirements over the peak periods without further charging.

EXAMPLES OF INCREASED CONSUMPTION FOR THE SAME MAXIMUM DEMAND

Often when the requirements of a factory are studied it is found that there are additional processes for which electro-heat can economically be employed because furnaces or other equipment can be arranged to be switched off or to take a reduced load during periods of peak demand. A sheet metal foundry with an early morning peak found that it would be an economical proposition to use an infra-red oven switched on after the peak period had passed because such ovens are ready for use in a few minutes. The possibilities of electric space heating in this respect are dealt with in Data Sheets 18 and 19.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books are available on electricity and productivity (8/6 each, or 9/- post free) — 'Higher Industrial Production with Electricity' is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity. Ask for a catalogue.

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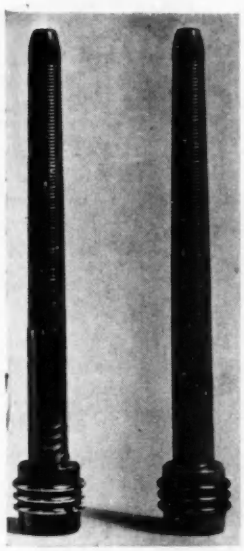


(left) Examples of the MANRA Vee pirn. The main feature is its finely grooved surface (20 grooves per in.) which ensures a good grip of the yarn

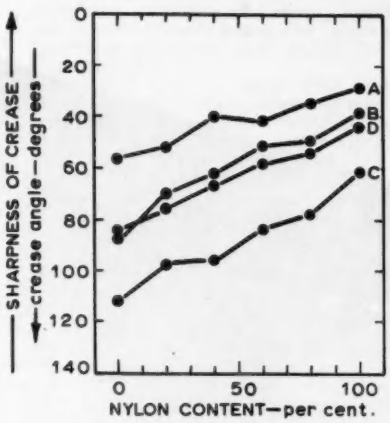
The pirn has been tested in mills and Table 1 shows the reductions in winding tension achieved.

Table 1

Material	Winding Tension in gms. Old Pirn	MANRA Vee Pirn
60 den. Nylon	20 - 25	13 - 18
100 den. Viscose (1st mill) ..	30	20
100 den. Viscose (2nd mill) ..	25 - 30	15 - 18
150 den. Viscose	35 - 40	25 - 30
80 den. Bemberg	25 - 30	18 - 20
100 den. Bemberg	40	30
140 den. Acetate	35 - 40	25 - 30
100 den. Acetate	25 - 30	15 - 18
50 den. "Terylene"	25	15

The mills reported they could have reduced the tension further and the tension values reported allowed them a good safety margin. The result of these low winding tensions was a fuller and more relaxed appearance of the fabric, elimination of strained weft, a substantial reduction in the incidence of snatching at the pirn tip, and in some cases an increase in cloth width by $\frac{1}{8}$ to $\frac{1}{4}$ in.

The pirn is manufactured by British Northrop Ltd., Blackburn, in a standard size measuring $7\frac{3}{8}$ in. overall with a No. 5 butt. If required, it may also be supplied with either No. 3 or No. 4 butt. For use on looms with electric weft feeler it can be supplied with a nickel-plated feeler sleeve and, for use with photo-electric weft feelers, with light-sensitive tape fitted to the barrel. The pirn butt has been shaped so that it can be used on the Unifil loom winder.



Fibre Identification

Shirlastains A (1940) and C (1945) are well-known fibre identification stains but two new stains are now available. Shirlastain D is employed specifically for distinguishing between cotton and viscose rayon and Shirlastain E has been evolved to give a satisfactory range of colours to thermoplastic fibres. For regular and systematic use Shirley recommend that fibres or fabrics should first be tested to distinguish between thermoplastic and non-thermoplastic types. Shirlastain A should be used for non-thermoplastic fibres and Shirlastains C and D regarded as supplementary stains for finer distinctions between cellulosic materials. Shirlastain E is for thermoplastic fibres, etc., and a supplementary stain for thermoplastics is Shirlastain A - D, obtained by making an acidified mixture of A and D.

Sizing

The results of experiments of a new method of fibre laying in sized warps were extremely interesting and the production model of this device is now being made by Conwell Engineering Co. Ltd., Walter Street, Blackburn, under licence from Shirley Developments. Self-brushing is a method of laying down the fibres projecting from warp yarns, and of smoothing out the size-paste on the surface of the yarns, by brushing the undried sized warp longitudinally against itself. The treatment can be applied to all types of spun yarn and is carried out at the sizer as the warp passes from the squeezing rollers to the drying system. The treatment gives beneficial effects in weaving and reduces fibre loss and decreases the warp yarn breakages. The photograph shows this equipment in routine use in a member's mill.

Technical Information

The following publications are available from I.C.I. Ltd., Dyestuffs Division, Blackley, Manchester 9:—

No. 633. Autumn 1961 Fashion Colours—Nylon Hose (Midland Hosiery Dyers' and Finishers' Federation).

No. 636. Printing "Terylene" Polyester Fibre.

No. 113. Cirrasol AC. A cation-active agent that produces excellent soft finishes on cotton, wool, viscose, acetate, nylon, "Orlon" and "Acrilan" fabrics.

No. 136. Lubrol CB. A new rayon spin bath additive.

Russian Visit

Over the past few years Shirley Institute has sent specialist teams to countries overseas to report on different sections of the textile industry. Teams have visited Holland, Italy, France and Germany, and four senior members of the staff are now visiting the Soviet Union. The team comprises Mr. A. Linnert (spinning), Mr. K. Greenwood (weaving), Mr. F. W. Thomas (finishing), and Mr. K. P. Norris (technical economy). The group will visit mills, machinery makers, research centres and technical colleges to observe the Soviet textile industry at close quarters.

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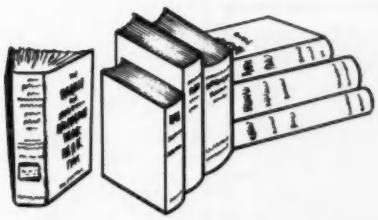


Reviews

BRADFORD TEXTILE SOCIETY JOURNAL 1960-61. Edited by G. G. Hopkinson. Obtainable from the Secretary, 95 Godwin Street, Bradford 1 (price 12*s.* 6*d.* per copy).

Never lacking in either presentation or quality this excellent annual publication reflects in no uncertain manner the confidence and vigorous outlook of those who manage the Society's affairs. Following the stimulating annual and presidential addresses by Lord Rochdale and Mr. P. A. Holt over a dozen lectures are reproduced including, "What Makes Firms Progressive," "British Wools," "Horizontalism and Verticalism," "Impressions of Russia," "Sir Richard Arkwright, the First Great Textile Manufacturer," "Clothing's Challenge," "Acrylic Fibres: Courtelle," "Wool Growing in Australia," "Fashion and Fancy Yarns," and "Exporting: The Banker's View." Beautifully illustrated, the colour reproductions are superb, and content and price make it a valuable work certain to be appreciated by most textile men. As a distinct change from technical and scientific work it is a pleasure to read.

S.P.D.

* * *

ENCYCLOPEDIA OF MICROSCOPY. Edited by G. L. Clark (Research Professor, Analytical Chemistry, University of Illinois, U.S.A.) Reinhold Publishing Corporation, New York and Chapman and Hall Ltd., London (price £10).

The fourth in a series of Reinhold integrated compilations, this recent unique publication is a companion volume to the "Encyclopedia of Spectroscopy." These two great instrumental techniques, valuable in so many disciplines, are so intimately related and interwoven that the simultaneous development of encyclopedias was certainly the most logical procedure. This latest excellent reference work—a fine testimonial to the joint efforts of an international team of English, Scotch, Canadian, South African, French, Swiss, German, Dutch, Swedish, Japanese and American microscopists—covers 26 kinds of microscopy in over 140 full-scale articles extending over 650 pages. The biological, medical, pharmaceutical, forsenic, chemical, engineering, textile and industrial applications of microscopy as presented in this work are probably the most complete ever offered in one volume. Many of the 600 illustrations are amongst the best electron micrographs to be seen and studied and the coverage of every conceivable aspect of electron, electron mirror and field emission microscopy is an extraordinary scientific achievement. Entirely new and, hitherto, unpublished material on the solid image microscope, the ultrasonic microscope and on electronic combinations such as flying spot and TV microscopes is another significant contribution of this remarkable book. Completeness and importance of coverage is also exemplified by contributions from acknowledged authoritative sources which present the microscopical identification of fibres high polymers, plastics, etc. The 20-page section devoted to animal, vegetable and man-made fibres is, in itself, a very fine effort but one would have liked to have seen some mention of Preston's magnificent early work in this sphere of microscopy. This chapter deals extensively with preparation techniques, staining methods and chemical reactions and with special micro-techniques. The average birefringence values for 27 different fibres is included and fibre characteristics are briefly but very lucidly presented. An extensive list of the contents eliminates any need for an index and each section is complete with references to other valuable literature. A very significant addition to the published works on this subject this book will inspire all students in their studies. On merit alone, it is an invaluable addition which all technical, research and similar libraries should have available. Expensive, undoubtedly, but well worth the price.

REX

* * *

SILICONES AT WORK. Department of Scientific and Industrial Research, State House, High Holborn, London, W.C.1.

In this booklet D.S.I.R. reviews the industrial applications of these versatile compounds, showing how they do useful service in the textile, plastics and other industries. The greatest use of silicones in the textile industry has been in applying water-repellent finishes to some of the newer fibres nylon, cellulose, acetate, "Terylene," "Orlon," etc. Silicone treatment has proved particularly effective on nylon. On cotton and other "cellulosic" fabrics it has, so far, been less successful. In the engineering industry, where they are put to a great variety of uses, the value of silicones varies according to the conditions. As lubricants they are satisfactory with bearings made of rubber or plastics or some non-ferrous metals; but not, under heavy loads, where steel is in contact with steel.

* * *

WARP TUBES FOR RING SPINNING AND TWISTING FRAMES. British Standards Institution, 2 Park Street, London, W.1 (price 4*s.* 6*d.*).

A revision of B.S. 2578 introduces several important changes in the specification for warp tubes for ring spinning and twisting frames. The only tubes now specified are those for use with spindles with spring grip. The range of tube diameters has been extended, while the thickness of the tube is no longer specified. Both dome top and open top tubes can now be used on the same type of spindle. This latest edition gives no recommendations as to the size of tube suitable for a given ring diameter, but tables have been included to show the diameter of tube required to give a desired angle of pull at the top of the lift for any ring diameter. The revision is based on international standards (I.S.O.) proposals.

CABMA REGISTER 1961-62 OF BRITISH INDUSTRIAL PRODUCTS FOR CANADA. Ninth edition. Published jointly by Kelly's Directories Ltd. and Iliffe Books Ltd. (price 15*s.* 0*d.*).

Published annually since 1953, the classified list of products consists of more than 3,000 British products available to the Canadian market, with their suppliers given under each heading. The French equivalents of these headings are set out in alphabetical order in a separate glossary. A directory of nearly 4,000 British firms gives details of their distribution arrangements in Canada. Proprietary names and trade marks are given in special sections which enable the Canadian buyer to identify products and their sources of supply. The six sections of the register are easily identified by the slotted index and tinted paper.

* * *

STANDARD METHODS OF TEST FOR COATED FABRICS. British Standards Institution, 2 Park Street, London, W.1 (price 15*s.* 0*d.*).

This publication (B.S. 3424) brings together, in revised form, the methods of test originally specified in B.S. 2601 - 3 "Coated Fabrics (Leathercloths) for Upholstered Furniture (P.V.C., N.C. and L.O. types)" and also B.S. 3217 "Air-permeable P.V.C.-coated Fabrics for Upholstered Furniture." These two standards are accordingly being revised, the former appendices being deleted and the performance requirements related to the new standard methods of test. Future standards for coated fabric will, so far as is practicable, also make reference to these standard tests. The new standard includes methods dealing with roll characteristics, conditioning, weight determination, tensile and tear strength, coating adhesion, flex cracking, surface drag, heat ageing, colour fastness, discolouration by sulphides, flammability, permeability by air and water, shrinkage, wicking, dimensional stability, tension set and fusion.

* * *

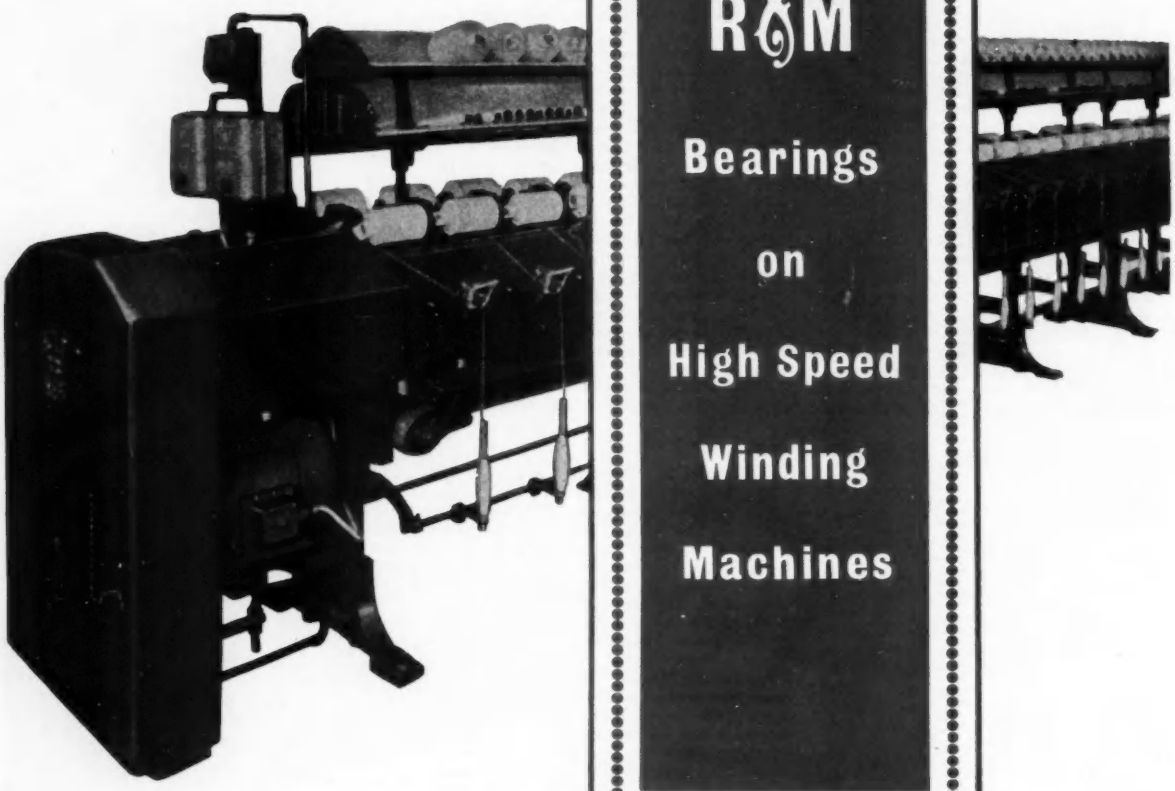
HUMAN SCIENCES AID TO INDUSTRY. Department of Scientific and Industrial Research. H.M. Stationery Office (price 2*s.*).

The aim of this booklet—No. 12 in the series "Problems of Progress in Industry"—is to review the scientific approach illustrated in these studies and to discuss the emergence of general principles of human behaviour applicable to industrial skills and organisation. Following an introductory chapter, three other sections discuss (*a*) studies of human efficiency, (*b*) studies in social organisation and human relations and (*c*) problems and prospects.

* * *

DROP WIRES FOR WARP STOP MOTIONS. British Standards Institution, 2 Park Street, London, W.1 (price 7*s.* 6*d*).

In this new edition (B.S. 2609) the standard specifies a range of drop wires made from steel strip for use in weaving cotton, wool, worsted jute, flax, silk and man-made fibres. The drop wires, which are in accordance with pending (I.S.O.) recommendations, are marked accordingly. The appropriate weight and range of each types of drop wire is given for cotton yarns or their equivalent in other fibres.



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Trade Catalogues

HUMIDITY INSTRUMENTS. List 70/1, issued by Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London, S.W.1, deals with their range of hygroscopic and wet and dry bulb humidity indicators, recorders and controllers. The instruments described include a hygroscopic indicator for measuring the moisture content of paper and similar materials, mechanical and electrical wet and dry bulb recorders, combined temperature and humidity recorders and various types of controllers including a multi-point electronic recorder/controller. The publication also provides general information on several humidity control systems.

* * *

STIRRING MOTORS. Leaflet P.2118, available from Griffin and George Ltd., Ealing Road, Alperton, Wembley, gives concise information on the new Griffin-Citenco stirring motors, of particular use in the preparation of chemicals involving the use of liquids with high viscosity. It has variable speed adjustment also the ability to produce high torque at low speeds through a reduction gearbox. Incorporated in this motor is a dynamically balanced armature in sleeve bearings and integral fan cooling. A point of special interest is the combined bracket and bosshead, which permits the stirrer to be aligned in three different planes at right angles.

* * *

TIN-NICKEL PLATED WEIGHTS. A new set of analytical weights produced by Griffin and George Ltd., Ealing Road, Alperton, Middlesex, besides being of interest to educational authorities will also be of great use to all laboratories for routine weighing. Manufactured to the former N.P.L. Class B standard, full details and prices are given in leaflet P.2119. The weights are brass, finished tin-nickel plate and polished, and are of two-piece construction. Tests carried out at the National Physical Laboratories have shown that the tin-nickel alloy finish has no undesirable magnetic properties and is resistant to corrosion by alkalis, nitric acid and other acids at normal temperatures. The alloy is also very hard wearing and does not tarnish. The sets are supplied in plastics cases with moulded blocks of polythene to hold the unit weights. The fractional weights are contained in a removable plastics tray.

* * *

EASIER LAUNDERING OPERATIONS. A new illustrated booklet dealing with the application of Arquad 75, a laundry processing and conditioning aid, produced by Armour Hess Chemicals Ltd., Littleborough, Lancs. The use of Arquad 75 is claimed to speed-up and improve laundry operations, and the resultant work is stated to have a soft luxurious finish. Copies of the booklet are available from Alcock (Peroxide) Ltd., Leicester Road, Luton, Beds.; Hardings (Pendleton) Ltd., New Thomas Street, Pendleton, Manchester 6 and Charles Tennant and Co. Ltd., 214 Bath Street, Glasgow, C.2.

USES OF NICKEL. The section concerned with heat- and corrosion-resisting materials is a feature of a recent issue of "Nickel Bulletin" by the International Nickel Co. (Mond) Ltd., Thames House, Millbank, London, S.W.1. Attention is drawn to papers reporting corrosion tests on nickel-containing steels in Canadian and tropical atmospheres, and to recent literature covering studies carried out to determine the mechanical properties of stainless steels and the resistance of various nickel-containing materials to specific corrosive media. Literature on nickel plating receives due consideration, and, in this connection, attention may be drawn to items summarising the salient findings of a comprehensive review of the present status of decorative nickel-chromium plating and outlining the scope of A.S.T.M. specifications on corrosion testing and double-layer nickel coatings.

* * *

GUIDE TO WELDED TUBE ECONOMY. The manufacture, types and applications of Permbrite welded stainless steel tubes, together with some cogent reasons for their use, form the subject of an illustrated booklet published by Rollo-Hardy and Co. Ltd., Paddockhall Road, Haywards Heath, Sussex, a member of the Compoflex group of companies. As well as lists of applications, including examples from such firms as I.C.I. and ranging from heat exchanger tubes to seat and trolley frames, the booklet gives details of the four types of stainless steel used in the manufacture of Permbrite tube. Tables of the alloy composition, together with maximum pressures and weights per foot for a range of outside diameters and wall thicknesses are also tabulated.

* * *

ZINC ALLOY DIE CASTING. "Die Casting News," No. 5, available from Zinc Alloy Die Casters, 34 Berkeley Square, London, W.1, highlights several examples of the versatility of the zinc alloy die casting process. These include record player turntables, large and small Shepherd castors, a battery-operated gas lighter, printing card punch, pressure gauge housings, etc. Mechanical properties of two of the alloys are clearly tabulated.

* * *

WOVEN GLASS FIBRE FABRICS FOR PLASTICS REINFORCEMENT. British Standards Institution, 2 Park Street, London W.1. (price 4*s.* 6*d.*).

Part 3 of B.S. 3396 is now available and covers fabrics specified in parts 1 and 2 which have undergone a finishing treatment to make them suitable for use with polyester resins. Various types of treatment are provided for, and requirements in relation to the final properties of the material are laid down.

* * *

METAL PROTECTION, ETC. Concise and valuable information for engineers, mechanics and all maintenance men is clearly given in a very useful booklet issued by Sternol Ltd., Royal London House, Finsbury Square, London, E.C.2. The uses, advantages and applications of Sternolease rust solvent are included, also those of the company's de-watering fluids, rust preventatives, cutting and heat treatment oils, hand cleansers and barrier creams. A price list completes this handy publication.

* * *

FORK TRUCK STABILITY TESTS. British Industrial Truck Association, York Mansion, 94-98 Petty France, London S.W.1 (price 2*s.* 6*d.*).

This worthy booklet contains the tilting platform tests for fork lift trucks adopted by members of the Association. Test No. 1 is concerned with longitudinal stability (stacking); No. 2 (travelling); No. 3 lateral stability (stacking); No. 4 (travelling).

* * *

FABRIC FACTS. Fairchild Publications, Inc., 7 East 12th Street, New York 3, N.Y., U.S.A. (price $1).

The revised edition of this pocket-sized publication gives more than 675 commonly-used fabric and fibre terms and defines in non-technical language the fibres, weaves, patterns and finishes frequently used in the field of textile-apparel designing, buying, advertising and selling. Included in the alphabetical listings are trademark names of a large number of manufactured fibres.

* * *

INDUSTRIAL HOSE. Produced by the Fibres Division of I.C.I. Ltd., an excellent, well illustrated booklet deals with some of the great advances in industrial hose made possible by "Terylene." At one extreme "Terylene" reinforces the giant 72 in. dia. rubber sections which accommodate expansion in joints of heavy steel piping; at the other it reinforces the ¼ and ¼ in. i.d., hoses required for hydraulic systems on power tools and car, etc., brakes. Other applications includes reinforced oil hose, water cooling hose, general purpose and low temperature hose, fire chemical hose and other important industrial types.

* * *

"STOP-ON-PICK" FOR DOBCROSS LOOMS. A new booklet released by Irvin Hudson Ltd., Ingleby Street Works, Bradford 8, Yorks, details the features of these very efficient motions for plain, 2×2 box, 4×4 box, 6×6 box and automatic Dobcross looms of both under-pick and whip-pick types. They are designed for fitting to looms with friction clutch or fast and loose pulley drives and explicit illustrated instructions are given for fitting them in the loom in both cases. Full setting instructions are followed by precise advice where weaving faults may arise, and a full spare parts list completes this handy little publication.

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Textile Trade and Prospects

Trade Stagnation in Lancashire

The volume of trade in yarn and cloth is still well below the levels of present productive capacity and only short-time working in some units in spinning and weaving prevents stocks rising to unhealthy figures. In others, ending evening shift work has balanced the falling off in demands. Most yarn qualities have been affected with few bright spots in any particular counts. It is difficult to pin-point any one major factor causing this stalemate. International tension, forecasts of a larger U.S. crop, reduced off-take in several important industries (notably the car trade), uneasiness about price stability, wages problems and the cumulative effects of imports from the Continent and farther afield. All these, and more, reflect unfavourably on Lancashire's efforts to keep machinery and turnover in something like equilibrium; in fact, some managements despair of ever seeing reasonably settled conditions for a very long time ahead.

Of the available business, most demand has been for standard weaving qualities in coarse and medium numbers on cop, cheese, cone and ring beams for early delivery. Hosiery qualities have lacked support although one or two blended yarns were in request. Mule spun doubling wefts have only been in demand in small weights and the finer types of ring twists have moved spasmodically. Support has also been noticeably lacking in some speciality and fancy yarns. What business has been put through has been practically all on home account; little, if any export sales have occurred. Customers all round have shown no inclination towards buying on even a moderate scale.

Turnover in cloth has followed a similar pattern with few bookings of anything like sizeable orders. As recent consumer statistics are somewhat obscure it is not easy to relate fall-off to anything very tangible. Manufacturers' order books are, in many instances, woefully depleted with early delivery and bare margins remaining ineffective stimulants to trade. Another problem facing many mills is the loss of really skilled operatives, a situation aggravated by short-time working and apparent long-term insecurity of employment and the much better prospects offered in other industries.

Orders have followed a routine pattern but in less volume. The bulk of contracts finalised have been in a range of apparel cloths in woven and printed styles. Undoubtedly, most of the orders were for attractive screen and roller printed dress fabrics, and novelty designs in jacquard accounted for some of the sales. Spun rayons were also sold in modest lots and linings lacked firm support. Furnishing fabrics in the medium price brackets were probably the best sellers in a pathetic market. Little, if any, criticism can be levelled at this section of the trade in that most cloths are right in design, colour selection and price but the home market will not at the moment absorb any more in its extremely sluggish state. An increase in export orders would be more than welcome now but to wait hopefully for this to materialise is merely wasting time. Textiles, like any other consumer goods, need to be backed-up with the most vigorous sales techniques and service, and salesmen could find many excellent object lessons in other industries.

Interest in the many lines of household textiles is distinctly less than it was six months ago. Any falling-off in multiple store ordering has almost immediate repercussions in such lines as towellings and other terry specialities. Very popular two years ago, interest seems to have lessened in terry-type bedspreads, which perhaps accounts for the slightly better interest in alhambra type quilts and bedcovers. All cotton and cotton/nylon blankets have sold slowly, and sheetings and tablecloths have been in very poor request. The much slower trend of clearances through the various channels has had its effects all round. Even industrial specialities have been almost stationary. Few, if any, large orders have been negotiated and an air of stagnation permeates the entire trade. Many hope the turn of the year will see some improvement.

Wool Trade Topics

Total wool consumption by the ten main wool textile producing countries of the non-Communist world in the first nine months of 1961 was 1,466 million lb. (clean weight), only slightly lower than the figure for the corresponding period of 1960—a year in which a post-war record was set. Wool yarn output showed a 2% decline but wool tops and fabrics recorded an increase of 1%, according to the Commonwealth Economic Committee.

Australia's income from wool in the first four months of the current season is almost 20% higher than in the same period of 1960. Figures published by the National Council of Wool Selling Brokers show that sales of wool between July and October realised about £A100 million—£A16 up. More than 1·4 million bales were sold, an increase of 60,000 over the corresponding 1960 total. In the year ending June 30, the sale of more Australian wool to Japan and China helped to give Australia a favourable balance of trade with Asian countries.

Nearly 83% of the South African clip in the 1960-61 season was merino wool, according to the annual statistical review of the South African Wool Commission.

Native wools accounted for about 6%, coarse and coloured types, 5% and karakul wool just under 5%. Fleeces made up nearly two-thirds of the merino wool. Weight of wool sold in South Africa rose by 13% in the first four months of the current season. Figures increased from 80 million lb. in the July - Oct. period in 1960 to 91 million lb. in the corresponding months of this year. Total value of sales rose by about £2¼ million to nearly £15 million and the average price increased from 37*d.* to 39*d.* a lb. France overtook the U.S. as the main buyer of South African wool by taking 12·5 million lb. of greasy and scoured wool by the end of October. American purchases totalled 11 million lb. and Britain's—traditionally the best buyer —8·5 million.

Stocks of wool in the U.K. at September 30 were 218 million lb. (clean weight), 26 million lb. lower than at the corresponding date of last year, and the smallest total recorded in the U.K. since October, 1952. Included in the total reduction of the past twelve months is one of 19 million lb. (clean weight) in the size of the U.K. strategic stockpile of imported wool now undergoing gradual liquidation at auction. Stocks of wool tops in the U.K. on September 30 were 63 million lb. —about five million lb. lower than a year earlier.

In the first ten months of 1961 the U.K. imported 546 million lb. of raw wool—an increase of about 2% over the figure for the corresponding period of last year. Britain's exports of wool tops in the ten months were 77·3 million lb., compared with 76·8 million lb. in the similar period of 1960, and exports of wool cloth were 71·4 million sq. yds., against 76·4 million sq. yds. Britain's wool textile exports during 1961 are expected to earn £160 million in foreign currency, which would place the industry sixth among the country's leading export industries. National Wool Textile Export Corporation says that on the basis of Jan. - Sept. figures, U.K. exports of wool tops during 1961 should exceed the 1960 total of 91 million lb. Yarn exports will almost certainly be lower than in the previous two years but may exceed 29 million lb., while wool cloth shipments seem likely to be 4 or 5% below last year. Of possible significance, the N.W.T.E.C. adds, is the emergence of European Common Market countries as the largest collective export outlet for British wool textiles as a whole, displacing North America, which has held this position for many years.

Linen Trade Review

The question raised at the recent Cotton Board Conference "Has scrapping gone far enough?" might be asked with equal candour in the linen industry, where it would undoubtedly also evoke divergent views, with the majority conceding the inevitability of further contraction—particularly in the spinning section. While no recent census has been taken of the number of spindles and looms still in the production line the former are estimated at around 400,000, approximately 40% of the pre-war total. Due to greater adaptability the weaving section has not contracted accordingly, around 20,000 looms being still available.

While the progressive decline in demand for British cottons and linens stems from a different cause—rapidly expanding world productive capacity with increasing competition from low labour cost countries in

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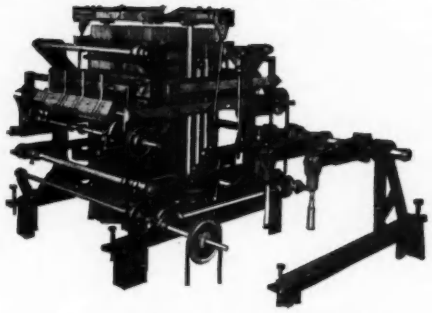

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the case of cotton, and increasing competition by rival textiles on a price basis in linen markets—the remedy is the same for both. The linen industry, however, has greater scope for bridging the price gap in that its products still possess certain prestige value. This could frequently be enhanced at little extra cost by more detailed study of consumer interests and by better presentation.

Despite the fact that over £25 millions has been spent on re-equipment in post-war years, comparing favourably with capital outlay for the same purpose by the cotton industry, and while the increase in raw material values has favoured linen, the price gap between it and its main competitor has tended to widen rather than contract. This has been due in part to greater advances in short cut processing in the cotton industry, and also to the higher measure of automation achieved.

Did British linen manufacturers generally take full advantage of the means available to improve their competitive position when planning their re-equipment schemes? The number of casualties among re-equipped mills provides an adequate answer. There is still too great a tendency to modernise on traditional lines or, at best, to accept a limited break which cannot be fully exploited because it constitutes only part of a sequence. More constructive thinking and further substantial capital outlay will be necessary to enable the industry reap the advantages to be gained by entering the Common Market. While this applies equally to the wet and dry spun sections the approach in each instance is different. The future for the former lies in producing quality linens for an expanding market which will become increasingly quality conscious as the standard of living advances. Even in this sphere profit margins will continue to be dominated by rival textiles so that selling price will be a deciding factor of demand. Dry spun products will encounter more direct competition from Continental sources with an initial price advantage due to freight costs, which can only be offset by greater efficiency in production.

The wet spun section is emerging gradually from the recession of recent months during which it suffered further casualties, particularly in the spinning end where some of the composite units have concentrated their activities and offset the reduced spindleage by increased shift working. The build up of stocks for the Christmas market has been on a smaller scale than in previous years, with retailers and merchants withholding their coverage requirements long past the usual buying season. Orders booked in recent weeks have altered the immediate outlook in the spinning and weaving sections, which are now assured of coverage against commitments or stock replacements on a sufficient scale to maintain production at current level until the turn of the year. Demand covers the whole range of household goods with damask table linens a strong feature. Handkerchief manufacturers report good business in recent weeks, which has stimulated activities in the fine end.

Jute, Fibre, Yarns and Fabrics

From the beginning of November there was a fair reduction in prices of both white and dark jute. This is the time of season that arrivals of loose jute from up-country in Pakistan should be at their peak but cultivators are holding back supplies. However, this cannot continue indefinitely because not only has the question of finance to be faced but there is also the storage problem.

Practically all overseas countries remained out of the market for several weeks and this weakened the market considerably. The lower values are not attracting buyers to any extent and business passing is just sufficient to meet current requirements. First-hand reports from Pakistan say that there should be ample jute to meet all requirements but the quality in the higher grades of white jute may be poor. On the other hand there should be a surplus of the lower grades.

There has been evidence of this during most of the season. Prices of the lower grades have declined but the better qualities have remained at very high price levels. At present the price difference between Mill Hearts and Mill Lightnings is at least £25 per ton with a further jump of £24 to Mill Firsts. Last year when prices were very much higher the difference between these grades was only £4 and £10 per ton, respectively. The same trend has taken place in the case of dark jute but to a much lesser extent.

During the first half of November offers of medium and lower grades of both white and dark jute were being made at well under E.P.C. levels and although adjustments were made to the official rates sellers were still willing to accept less, even for current shipment. This gave the impression that the Pakistan authorities were trying to maintain raw jute prices by artificial means. Many shippers in Pakistan were accumulating stocks of Mill Hearts and grade Hearts and they were anxious for business as much of their capital was tied up. Cultivators are reluctant to accept lower prices for their labours but balers are afraid to pay the prices asked as there is the possibility of a further fall in values.

Offers were being made at £152 for Mill Firsts, at £128 for Mill Lightnings, at £102 10*s*. for Mill Hearts and at £82 10*s*. for grade Hearts, c.i.f. U.K., for November shipment, and at £151, £126, £102 and £82 December. Dark jute prices were irregular with grade Tossa-2/3 at £138, grade Tossa-4 at £124 and Continental Tossa-2/3 at £108 10*s* c.i.f. U.K., November and about £1 per ton less would be accepted for shipment a month further ahead. Crack Daisee-2/3 was available at £122 and grade Daisee-2/3 at £106 December. One or two offers of the higher grades were being made with crack Hearts at £173 and crack Tossa-2/3 at £153 November. Cuttings also declined in price with N.C. offered at £50. The outlook for the future is that the higher grades of white jute will remain firm because of shortage of supply but the lower qualities may continue to decline in value. The Tossa position is more regular and a large supply of good quality fibre should be available during the course of the season.

The Calcutta goods market has also become easier during the past month. An increase in working hours during September and a further increase in October raised the output and although there has been a steady demand, this has made for lower values. With the Indian crop of raw jute now coming on the markets in larger quantities the outlook for the future should be that prices will remain around the present levels and this will be much more attractive to consumers. Prices are at 76*s*. 3*d* for 10 oz. 40 in., and at 57*s*. 9*d*. for 7½ oz. per 100 yds. f.o.b. Calcutta for November shipment, at 72*s*. 6*d* and 54*s*. 9*d*. December, at 70*s*. and 52*s*. Jan./Mar. and at 69*s*. 6*d*. and 51*s*. 9*d*. April/May. "B" twills are at 209*s*. 3*d*., 197*s*. 6*d*., 192*s*. 3*d*. and 190*s*. 3*d*. for the respective shipment periods.

With the exception of a large order received in Dundee for a minimum of 7 million grain bags for delivery over the next five years, demand for yarns and cloth has not been large. A small, but steady, movement has taken place for delivery up to two months ahead. This is only to be expected because of the weak raw material position and buyers are looking for still lower prices in the future. As long as consumers can obtain delivery a short distance ahead it is unlikely that much buying will take place for forward delivery.

Silk and Man-Made Fibres

Trade in the various Lancashire sections remains at unsatisfactory levels with demand in many cases confined to novelty and speciality products. Bread and butter styles in viscose cloths and viscose/cotton blends especially are in great need of a fillip at present. Spinners report reasonably steady demand from the knitwear trade and woven cloth manufacturers view with some apprehension the steady growth of knitted garments, both jersey fabrics and warp knit. Even traditional shirtings are affected by the intense competition from all-nylon warp knit, in addition to the wide variety of imported styles.

In both roller and screen printed furnishing fabrics the off-take is rather slow but some lines of woven dobby and jacquard cloths have been better supported. Some nylon and all "Terylene" apparel cloths have been in good request.

The Yorkshire woollen trade is feeling the effects of cheap imports and Continental competition is undoubtedly keen. In worsted sections, however, business is quite brisk on both home and export account. A distinct feature here is the steady interest in "Terylene"/wool blends for both ladies' and men's suitings. "Acrilan," in blends with wool for men's suits, is also in regular repeat demand especially in the lighterweight fabrics.

Sales of all nylon yarns in the knitwear trade remain at good levels and in the Midlands all rayon double jersey and rayon/wool blends sell well; bulked acrylic yarns are popular in knitted sweaters and jumpers. There is still no indication of a return to favour of the "jumper suit" of a decade ago. Warp knit fabrics increase in popularity and the spread of warp knit fabrics into other sections of the clothing trade is forecast, as a result of the introduction of multi-bar machines. For this trade nylon and "Terylene" flat yarns are in good demand.

In the stocking trade seamfree hose are as popular as ever although some manufacturers are cautious of committing themselves too far by installing new banks of machinery on too large a scale. The fully-fashioned stocking still accounts for a fair proportion of the trade but little change is expected in the proportion of seamfree in the foreseeable future.

In Macclesfield, weavers are reasonably busy, but printers, both roller and screen, find things very slow just now. Demand for foulards is said to be good and for tie fabrics in spring ranges there has been some good business reported.

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Notes and News

A.S.T.M. Changes Name

The name of the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pennsylvania, U.S.A., has been changed to the American Society for Testing *and* Materials. In announcing this change, A.S.T.M. President, Mr. M. N. Clair, said: "The inclusion of the word 'and' in the Society's name places added emphasis on the Society's research work in seeking knowledge of the nature of materials. It is a further re-emphasis of one of the basic purposes for which A.S.T.M. was founded in 1898. Since then, the work of the Society has been devoted to the fulfilment of its basic objectives, unchanged from the original charter which states: 'The corporation is formed for the promotion of knowledge of the materials of engineering, and the standardisation of specifications and the methods of testing.' And, to give greater stimulus to the work of the Society in the field of materials research, a Division of Materials Sciences was established two years ago."

* * *

U.S. Company to Start Spinning in N. Ireland

An American corporation, T. J. Stevenson and Co., Broad Street, New York, whose interests include shipping and textiles, has decided to establish in N. Ireland a subsidiary company, Ulster Textile Mill Ltd., is announced by the Ministry of Commerce. The company will take over the Government-built factory at Newry, Co. Down, formerly occupied by Horrockses Crewdson and Co. Ltd. (Six months ago Horrockses Crewdson announced their decision to cease manufacturing at Newry owing to foreign competition in the types of cotton yarn and cloth produced by the N. Ireland mill.)

The American company plan to carry out extensive modernisation and re-equipment of the most advanced design and to operate a three-shift system.

The work of re-equipment will last several months, and production is expected to start next spring, with the working force rising to 325, of whom more than 200 will be men. Ulster Textile Mill Ltd. will initially concentrate on spinning cotton yarn for British and export markets. Future plans provide for an expansion of the existing spinning capacity.

* * *

New Plastic Label

The new Flexolux labels, recently announced by Wam-Speedwork, Bowlers Croft, Basildon, Essex, have been developed specially for address and instruction use on packing cases, where rough handling and exposure demand utmost strength and resistance to abrading, weather, rodents, insects, and mould, etc. Another obvious use is in structural steelwork, castings, wire goods and ropes. The same material can be made up with brass eyelets and wires for attaching to products themselves. For case work, these labels are available, plain or printed, in almost any rational size up to 6 in. wide by 9 in. deep or in continuous lengths. The labels are generally in reel form and pinhole-perforated so that they can be overprinted. They also take readily to chinagraph and waterproof pencils. Flexolux labels are generally stapled on to the cases.

* * *

Visiting South Africa

Mr. B. Linz, chairman, L. Linz and Sons Ltd., Park Street, Manchester 3, sails on January 4 for South Africa to further the sale of "Unity" cutting machines which are being used in the textile industry generally and are also used for cutting asbestos in its various forms.

* * *

New Flexible Ebonite Tank Lining

Duraline, a new high-temperature hard rubber tank lining said to have a greater impact resistance and flexibility than any other true ebonite is now being produced by the Chemical Plant Linings Group, General Rubber Goods Division, Dunlop Rubber Co. Ltd., Cambridge Street, Manchester. Developed after considerable research it is particularly suitable for lining vessels for transportation of liquids, or vessels subject to vibration and shock. It has been used in environments up to 105°C. continuously for considerable periods without deterioration. The new lining does not harden in use, but rather softens slightly, resisting any tendency to become more fragile with age. It does, however, have a lower yield temperature than conventional ebonites and must be treated with greater care on flanges of vessels or pipes where bolting up operations are to take place.

Duraline is claimed to have been used for lining pipework to carry 45% sulphuric acid up to 110°C. intermittently for over two years without deterioration. It has also been used for lining chimneys carrying hot flue gases and has given trouble-free service over long periods. In dyeing sections it is used to facilitate high temperature operations up to 95°C. combined with regular scouring using boiling water and steam.

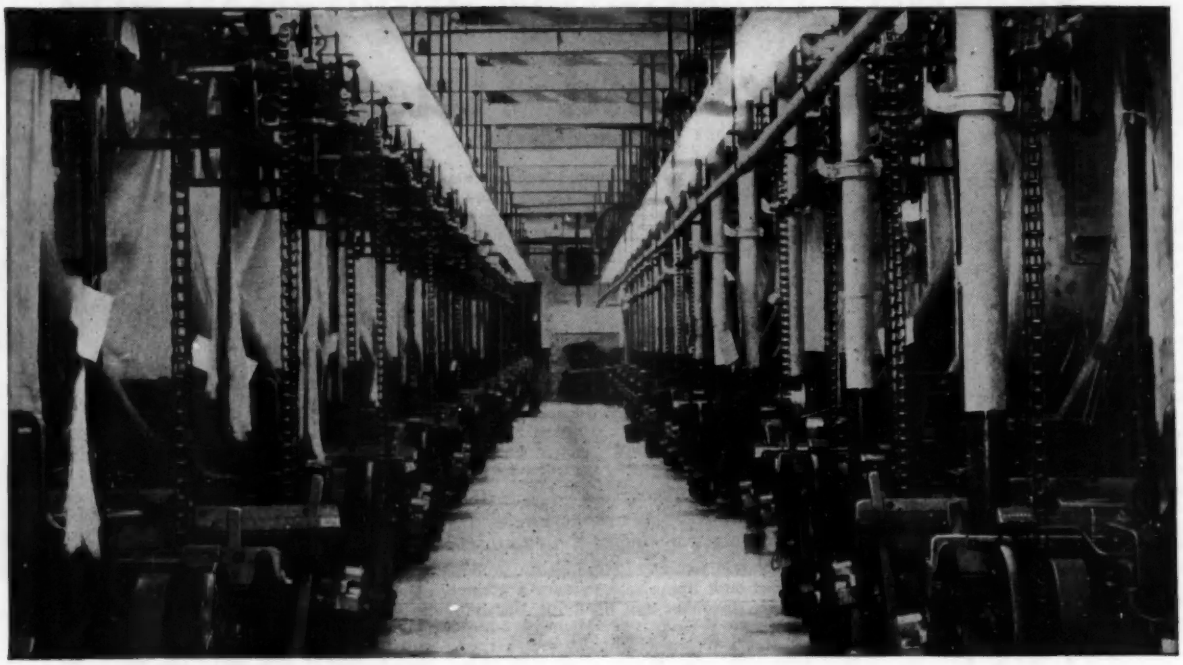
* * *

New Picanol Works at Ypres

The Belgian Prime Minister, Mr. T. Lefevre, recently opened the first section—a new assembly line having an area of 120,000 sq. ft.—in the plant extensions built on the outskirts of Ypres by Picanol Automatic Loom Works. When finally completed the new works will have an overall area of 410,000 sq. ft., which will include machine shops, a new fully automatic foundry and stores, also buildings housing a new central office block with large showrooms, in addition to small weave-rooms for training the technical staff of the company's customers.

Makers of the well-known "President" high-speed, single shuttle automatic loom introduced in 1955, Picanol state that production of this model has had to be continually increased to the point where, earlier this year, it had reached 20 looms per day. It is also interesting to note that some 3,000 "President" looms will have been installed in British mills alone by the end of next year. Pointing out that their present premises in Avenue de Pologne, Ypres, would not allow further extensions, Picanol decided to build new works at Avenue Charles Steverlynck, Ypres. In addition to increasing production of "President" looms, the company also intend to design and make a multi-colour high-speed automatic model, a silk loom and a heavy duck loom with all their variations demanded by customers' requirements. The Picanol programme has also been influenced by the situation created within the Common Market where 180 million people need clothing, in addition to a wide variety of technical and industrial fabrics.

Inspecting the new halls housing the assembly line, already in production. (l. to r.) Mr. A. Dehem, Lord Mayor of Ypres; Mr. A. Vanacker, President of the Chamber of Representatives; Mr. T. Lefevre, Belgian Prime Minister; Mr. A. Spinoy, Minister of Economic Affairs; Mr. Charles Steverlynck, President of the Board of Picanol



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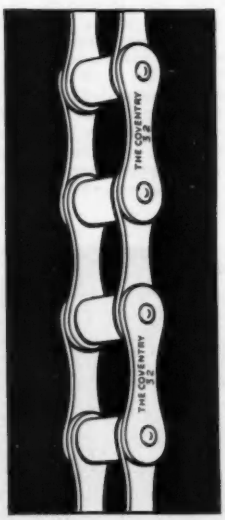

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New Interlinings for Dressmaking

A new range of Solena bonded fabric interlinings specially designed for home dressmaking is being introduced to the retail trade. Eight standard qualities will be available, suitable for use with all types of fabrics from sheers, nylons and drip-dry's to tweeds, velours and worsteds. In white, grey and black, the main advantages are (*a*) it is washable and dry cleanable (*b*) crease resistant and (*c*) the material can be cut in any direction without fraying. Solena is made by Bonded Fibre Fabric Ltd., Henrietta House, 9 Henrietta Place, London, W.1., a member of the Courtauld group.

* * *

Carpet Company's New Canteen

A new canteen to accommodate 250 employees is being erected at the Birstall Carpet Co. Ltd.'s factory at Brier Mills, nr. Leeds. Covering an area of 4,650 sq. ft., the super-structure is scheduled to be erected in four weeks by the use of the Vic Hallam Type 6 building system. Type 6 allows factory-made units to be assembled on site, with considerable saving in time. The previous canteen was located inside the factory, and its release provides extra space for production.

* * *

Growth and Expansion

Flexibox Ltd., Nash Road, Trafford Park, Manchester 17, have occupied a new additional office block. Although the original block was built less than five years ago, the move was necessitated by the growth in the company's business and will, the company point out, result in even better service to its customers.

* * *

Wool in U.S. Apparel Fabrics

Stronger competitive position for wool fabrics in the production of men's and women's apparel in the U.S. has developed during 1961. In an apparel wool review Ruth Jackendoff (director, Wool Bureau's department of economics and statistics) lists a series of absolute and relative gains compared with a year ago for clothing made of fabric containing 50% or more wool.

Production of midweight men's wool suits was 14% higher against a 28% decline in those of other fabrics; men's lightweight wool suits were down 5% against a decline of 24% in other types; and women's wool suits were 10% higher, in contrast to an 8% drop in other types. It is expected that wool textile production for the second half of 1961 will compare favourably with the first six months of the year and with the last half of 1960. This will increase raw wool consumption in the mills—especially as there has been a significant gain in the production of 100% wool content fabrics as compared with 1960.

* * *

Northrop Automatics for Egypt

British Northrop Ltd., Blackburn, Lancs., confirm that following negotiations in Cairo between members of their Board of Directors and the Five-Year Plan Organisation for the United Arab Republic, contracts have been secured for the supply of more than 2,000 Northrop automatic looms, accessories and spare parts. These looms are to be employed in four new cotton weaving mills which will form part of the new development scheme within the Egyptian Cotton Industry. A spokesman who took part in the negotiations said that he and his colleagues were very pleased to secure these orders, worth more than £2 million, in the face of very strong world competition. Production will be fitted into the company's existing programme, and deliveries will start in about 12 months' time; it will take a further 17 months to complete.

* * *

B.N.S. Glasgow Area Office

British Nylon Spinners Ltd. have transferred their Glasgow area office to more spacious accommodation at 95 Bothwell Street, Glasgow, C.2 (Tel. Central 9506).

* * *

Du Pont Fibres in Germany

Du Pont de Nemours International S.A., Geneva, Switzerland, are to form a new, wholly owned German subsidiary company, Du Pont Chemie G.m.b.H., for the sale of Du Pont textile fibres in Germany. With main offices in Düsseldorf, the company will be responsible for the sales of "Orlon," nylon, "Lycra" spandex fibre and other synthetic fibres manufactured by Du Pont. In addition, it will provide technical assistance, merchandising, and promotion services to German customers.

To meet the growing needs of European customers, a new plant, owned and operated by Du Pont de Nemours (Nederland) N.V., will soon begin production of "Orlon" acrylic fibre at Dordrecht, The Netherlands.

Du Pont de Nemours International S.A., a wholly owned Swiss subsidiary of E.I. du Pont de Nemours and Company of Wilmington, Delaware, U.S.A., sells through a network of distributors a wide range of products manufactured by Du Pont subsidiaries in Europe and the parent company in the United States. In addition to textile fibres, these products include elastomers, plastics, agricultural and industrial chemicals, films for packaging and other industrial uses, and photographic products. The company's sales operations cover Europe, the Middle East, North and South Africa, South Asia, Australia and the Philippines.

* * *

Personal

Mr. T. W. Bellis (publicity manager, Platt Bros. (Sales) Ltd. and managing editor, "Platt's Bulletin") has retired after over 30 years' service with the Textile Machinery Makers Ltd. group of companies. He has been associated with "Platt's Bulletin" since its first appearance in print. Mr. H. Bagot has been appointed to succeed him.

* * *

Modern Trend in Society, etc. Meetings

The season of institute, association and society meetings is here again and in the winter months thousands of enthusiasts from every trade and profession will gather in groups to discuss new methods, new techniques and new materials.

A modern trend in these events is the showing of well produced 16 mm. industrial films available on loan. One, "Tufnol in the Making," shows the manufacturing processes of laminated plastics and last Winter this film made a useful and interesting addition to the programme of more than fifty such gatherings, ranging from technical colleges to engineering associations and amateur societies. The film is an armchair tour of the Tufnol factory—an insight into the manufacture of laminated plastics. From the raw material stages, right through to the finished sheets, tubes and rods, one is left with an overall impression of the care and pride taken to produce a material able to meet the ever increasing demands of modern engineers. Copies, available on free loan to responsible bodies, may be obtained from Tufnol Ltd., Perry Barr, Birmingham 22B.

Curing time in the sheet press is complete and the Tufnol sheets are removed. (From the 16 mm. film, "Tufnol in the Making")

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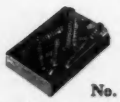
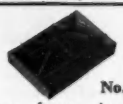


No. 760
Three dozen Assorted Light Compression Springs. 1" to 4" long, 22 to 18 S.W.G., ¼" to ½" diam. 7/6

No. 98A
Three dozen Assorted 1" to 4" long, ½" to ¾" diam., 19G to 15G. 6/6



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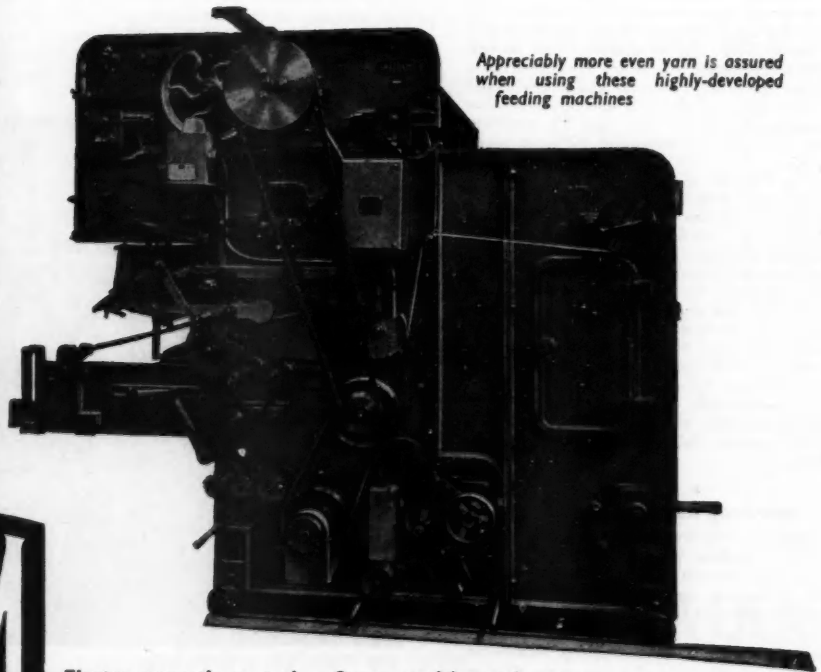

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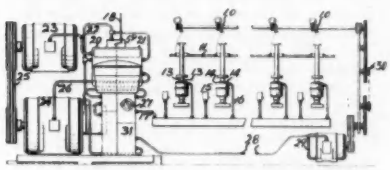
859,159 Driving for Spinning, and Twisting Machines

PRINCE-SMITH AND STELLS LTD., *Keighley*.

A spinning, doubling or twisting machine which incorporates electric driving means for the spindles, drafting or delivery rollers, and the building motion. The ring frame comprises yarn delivery rollers 10, ring rail 11 and spindles 13, each spindle being provided with its individual A.C. driving motor 14 the supply current to which is controlled by a separate switch 15 in a subsidiary circuit 16 fed from the spindle motor supply line 17. A mains A.C. supply line 18 is connected through an isolator switch 19 to a starter 20. The starter is connected by the line 22 with the main driving motor 23 which



is arranged to drive a frequency changer 24 through belt gearing 25. The excitation current for the frequency changer is supplied along line 26 from a contactor 21 fed with mains A.C. supply. The spindle motors are supplied from the frequency changer through the line 17, in which is interposed a reversing switch 27. The frequency changer also provides a supply through the line 28 for a geared motor 29 which serves to drive the rollers 10 through a suitable gearing train 30, and also the building motion (not shown) by which the traverse of the ring rail is effected. An overload release unit 31 is preferably incorporated in line 28. The speed of the changer 24 may be varied by changing the ratio between the motor 23 and th echanger. Alternatively the speed of the changer may be varied by employing a variable speed motor 23 and varying the speed of the latter as desired.

859,273 Applying Stacked Travellers to Rings of Spinning Frames

BRÄCKER A. G., *Pfäffikon, Canton Zurich, Switzerland*.

A device for applying travellers on to rings, which offers the advantage that a great range of traveller numbers can be applied with one device without parts of it having to be changed. In the device for separating and pushing-on stacked travellers, the foremost of the travellers pressed by means of spring force against a stop, is separated by a tongue and pressed by this tongue onto a ring. On a slide rail running parallel to the stacked travellers, a pressure-piece loaded with spring pressure is carried. The pressure-piece presses the travellers arranged in a row on a guide rail against a stop fixed on the tongue that separates the travellers.

859,279 Dyeing Process

WHIFFEN AND SONS LTD., *Willows Works, Derby Road, Loughborough*.

A process for brightening dyeings of metallized dyes on cellulose, wool or synthetic fibre, which comprises treating such dyeings with a solution comprising a metal sequestering agent. It is preferred to carry out the process with solution at a temperature in the range 20 - 100°C. and the time of the treatment necessarily depends on the temperature and method of treatment adopted but a time of 15 - 45 minutes is adequate. The pH is important and it is preferred to conduct the process with a solution at a pH below 7. In one example, a woollen material dyed with a pre-matallized Irgalan Orange RL dyestuff was treated in a bath at 30°C. for 15 - 30 minutes and containing:—

1 gm/litre Lissapol NC., 2 gm/litre ethylenediamine teraacetic acid tetrasodium metaphosphate, dosium tripolyphosphate or nitrilo triacetic acid. 4 ccm/litre formic acid (85%). pH 2 to 4. Liquid to goods ratio, 50 : 1.

The goods were finally washed in water and dried to give a product having a brighter colour than the original sample with insignificant reduction in depth or fastness.

859,514 Integrated Carding Processes

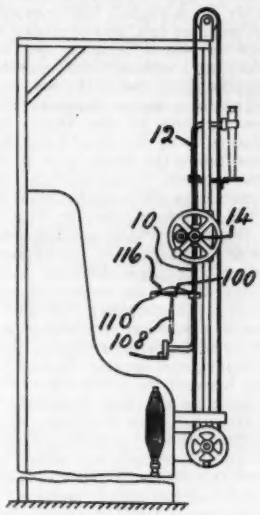
BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, *Shirley Institute, Didsbury, Manchester*.

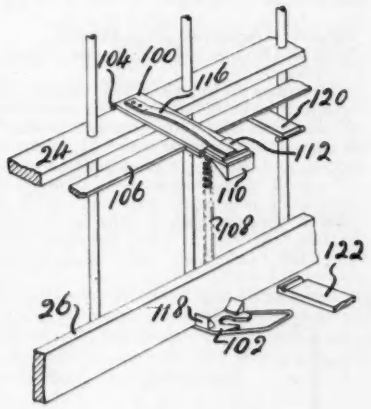
A number of masses of staple fibre are carded simultaneously to produce a corresponding number of the webs (as distinct from slivers), and webs are superimposed and then drafted together to form a single lap, these operations proceeding continuously in sequence. The drafting effect on the super imposed webs is adjusted according to the number of webs at any given time so that a single lap of constant characteristics is always produced for further processing.

859,631 Doffing Device for Spinning and Twisting Machines

F. W. A. SCRIVEN, "*Woodside*", *Old Pool Bank, Pool-in-Wharfedale, Yorks*.

An improved doffing device for ring spinning, twisting, and doubling machines, comprises two frames 10 and 12, frame 10 being adapted to doff full cops while frame 12 is adapted to don empty pirns. The frames 10 and 12 are carried on a shaft 14 which is mounted for rotation about its longitudinal axis, and for vertical movements relatively to the spinning frame in the manner described in B.P. No. 854,968, cop gripping means, is also constructed and arranged as described and illustrated in the aforesaid specification. The cop gripping means comprise a series of spaced pressure members 100, mounted on the rail 24 and adapted for engagement with the small end of a cop, and a series of spaced forked members 102 mounted on rail 26 for engagement with





the underside of the large end of the cop. Each member 100 is connected to rail 24 by a hinge 104, and to ensure that all the members 100 turn about their hinges in unison, they are interconnected by a bar 106 which extends along the length of the frame. The members 100 are resiliently urged towards the forked members 102 by means of a coil spring 108 to enable a cop to be effectively held between each member 100 and corresponding member 102. In order to compensate for slight variations in the lengths of different cops, a member 110 for engagement with the small end of a cop, is mounted on the free end of each member 100 by means of a hinge 112, each member 110 being provided with a recess to receive the small end of a cop. The hinge 112 is arranged so as to limit the turning of member 110 and

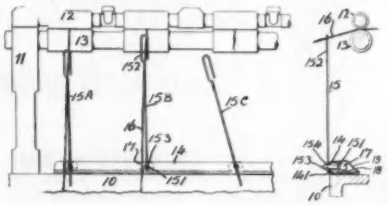
the member is urged towards its limit of movement by a leaf spring 116. Each member 102 is arranged so that it projects at right angles to the general plane of the frame and in order to prevent lateral movement of a cop, the outer end of the member is cranked towards member 100 and a wedge shaped block 118 is mounted on each side of member 102, the distance between the adjacent faces of blocks 118 being such as to accommodate the diameter of the large end of a cop. The spacing between each member 100 and its associated member 102 is slightly less than the length of the smallest cop, and to enable member 102 to be passed beneath the large end of the cop without the member 100 fouling the small end of the cop, means are provided for causing members 100 to be turned upward as the frame is being lowered to bring the forked members into position below the lower ends of the cops.

The method comprises one or more latch members 120 connected to bar 106 and which are engageable with catches 122. When the frame is being lowered to the doffing position in the manner described in B.P. No. 854,968, each latch 120 engages with its associated catch 122 and turns the members 100 about their hinges to a position where they are clear of the upper ends of the cops. The shaft 14 is then rotated causing the members 102 to pass beneath the lower ends of the full cops and then the shaft is raised. During such movement as the cops are being withdrawn from the spindles, the latch 120 moves out of engagement with the catch 122 and the members 100 are returned to their normal horizontal position, whereupon the members 110 engage with the small ends of the cops.

860,249 Improved Stop Motion

T.M.M. (Research) Ltd., *Hartford Works, Oldham.*

Describes an improved stop motion for spinning, twisting and winding machines. 10 indicates the roller beam on which is supported the roller-stand 11, carrying upper and lower front drafting rollers 12 and 13. Mounted on 10 is a bar 14 of electrically conductive material, which is pierced opposite each spindle by a pivot bearing 141 for a feeler member 15A, 15B, 15C, etc. Each feeler incorporates



a pivot 151 and an arm terminating in an open loop 152 through which is threaded the yarn 16. Mounted on the pivot 151 is a contact shoe 17 which is ordinarily held out of contact with a plate 18. The normal tension in the yarn supports the feelers 15 in the nearly upright position but in the event of a breakage or undue slackness, the feeler inclines by gravity to one side, causing the shoe 17 to make contact with plate 18. The closing of the circuit operates the stop-motion and the machine is brought to a standstill. Jacking screws may be provided for adjusting the vertical position of the conductor bar 14 for regulating the spacing between the plate and the shoes. In order to permit the feeler members to be adjusted for height, they are received in holes 154 drilled in the pivots 151 and secured in desired positions by set-screws 153.

860,273 Improved Drafting Apparatus

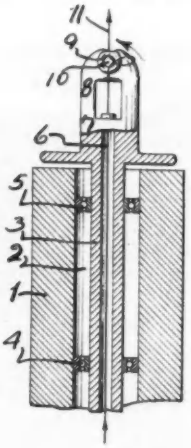
T.M.M. (Research) Ltd., *Hartford Works, Oldham.*

The object is to provide improvements in the manner of mounting the upper drafting rollers of drafting apparatus. For this purpose it is proposed that an upper roller element shall comprise a single boss mounted on an arbor which is supported resiliently by a single roller support arm. Preferably, the roller arbor is off-set from the roller support arm, so that the requisite weighting pressure is applied to the roller through the lever action of the off-set resilient roller support.

860,416 False-Twisting Spindle

N. V. Onderzoekingsinstituut Research *Velperweg, 76, Arnhem, Holland.*

In a false twisting spindle 1 denotes a stationary body with the aid of which the spindle may be mounted on the frame of a machine. This stationary body is provided with a bore 2 in which a tube 3 is mounted in ball bearings 4 and 5. The tube has a bore 6 and a part 7 which projects beyond the stationary member. The projecting part 7 is constructed as a pulley and at the end of the axial bore 6 this part terminates in a bridge-like extension-piece 8. A small cylinder 9 of synthetic sapphire, diamond or agate is cemented near the end of the extension-piece, the small cylinder being provided with a bore 10. The end surface of the



extension-piece is smoothly curved and inclines continuously towards the exposed part of the cylinder wall. On starting the false-twisting spindle a thread 11 supplied from a usual twist stop is first pulled through the bore 6 and then twice through the bore 10 so that the encirclement may amount to approximately 500°. Finally the thread is guided over a thread discharge device (not shown). When the thread discharge device is put into operation the thread will first be tightened whereupon it will be conveyed in an upward direction. The thread 11 will then soon move over the extension-piece 8 in the direction of the arrow, until the thread only encircles the small cylinder 9.

861,035 Improved Dyeing Method

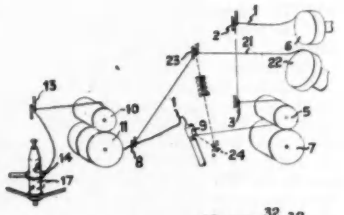
A. B. Svenska Textilmaskinfabriken, *Gothenburg, Sweden.*

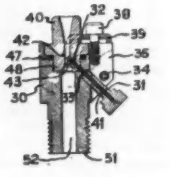
A method of dyeing fabrics and yarns, in which the dye is fixed, at temperatures above 100°C, comprises impregnating the material with dye solution, pressing off the excess solution and, possibly after preheating, winding up the material on a roll placed within a closable chamber. The chamber is closed and the material from the roll is rewound on a second roll also placed within the closed chamber, at the same time heating the material to a predetermined dye fixation temperature. The second roll is kept in the chamber at the adjusted temperature and at the corresponding superatmospheric pressure during a period of time sufficient to obtain a desired dye equilibrium. The heating of the material at least within the closed chamber is carried out by means of steam in such a way that the moisture content of the material is permitted to rise up to at most 92%, calculated on the moisture content at 20°C and the pressure power zero.

861,327 Novelty Yarns

E. I. Du Pont De Nemours and Co., *Wilmington, Delaware, U.S.A.*

A device for processing continuous-filament yarns so as to impart chenille-like and other desirable properties to them. The yarn 1 is supplied from package 6 through pigtail guides 2 and 3, to pass about cork cot 5 rotating in contact with drive roll 7 and into the nip of this feed-roll arrangement. The yarn then enters jet 9; from the jet outlet the yarn is drawn through pigtail 8 about drive roll 11 and into the nip of it with cot 10, about which the yarn passes on its way to the twister. The yarn goes through guide 13 and through traveller 14 then on to bobbin 17. Core yarn 21, which is supplied from package 22 through guide 23, also passes through guide 8, the forwarding rolls, centre guide, the traveller, and on to the bobbin, along with the yarn treated by the jet. In the jet, housing 30 receives casing 31 of tube 32 in bore 33, and screw 34 holds the tube. Side 35 of the housing, through which screw 34 passes into threaded side 36, is separated by a slit extending for a considerable part of the housing length. Screw 38 threaded into the top of the housing fastens clamp 39 to hold venturi member 40 in place. Coaxial with bore 33 of the housing when the elements are assembled is bore 41 through one side of the venturi member, which has recess 42 as an





extension of the bore in the opposite side across venturi throat 43. Gasket 47 encircles neck 48 of the venturi member and fits between it and a step in the top of the housing. Threaded air-intake 51 is at the base of the housing, which has main bore 52 coaxial with throat 43. A considerable angle intervenes between bore 33 and the main bore of the housing, and between bore 41 and the throat of the venturi.

861,340 Improved Lap-forming Machines

T.M.M. (Research) Ltd., *Hartford Works, Oldham.*

Is concerned with lap-forming machines of the type wherein a fleece compressed by calender rollers is fed forward to be wound in the form of a lap which rests upon and is driven by a pair of lap driving rollers. In a machine of this type, means are provided for accelerating the lap driving rollers to sever the lap and for maintaining this increased speed whilst doffing proceeds and until the leading end of the unwound fleece from the calender rollers has passed across both lap driving rollers. Means are provided for restoring the speed of the rollers to normal before the empty rollers is brought into contact with the fleece on the lap driving rollers.

861,345 Constant Warp Let-off

J. Picanol-Camps, *Mas Montserrat, Bandol, Var, France.*

Arrangements for unwinding warp threads in looms of the kind wherein the beam is driven by a ratchet motion having a variable length of stroke, actuated by the slay of the loom and subjected to the action of means adjusting the amount of let-off. A braking roller is mounted on the loom frame and a tensioning roller carried by a movable support in such a manner that the threads pass from the warp beam to the tensioning roller, over the tensioning roller and, lastly, over the braking roller. The support for the tensioning roller is connected with the means adjusting the amplitude of stroke in such a manner that the length of stroke increases when the tension in the threads increases, and decreases when the tension decreases. Means are provided for subjecting the support carrying the tensioning roller to the action of the torque exerted by a counterweight carried by an arm, the effective length of which increases as a function of the reduction in the diameter of the beam during unwinding, so that the tension in the threads remains constant.

861,387 Process for Crimping Yarn

Hindley Brothers Ltd., *Bankfield Mill, Nelson.*

An improved method for crimping yarns or filaments whereby the false twist tubes are eliminated and the speed of operation can be increased as compared with the method of imparting false twist. Yarn to be crimped is traversed longitudinally and during this movement is passed into contact with a belt moving across the direction of traverse of the yarn so as to impart false twist to the yarn. The direction of the yarn is changed as it passes in contact with the belt, and setting of the twist in the yarn is effected as the yarn is being traversed. Setting of the twist may be effected by applying heat to the yarn. Preferably, the yarn is passed successivley into contact with two belt flights and such belt flights may be moving in opposite directions.

861,476 Machine for Forming Pads

A. E. Callaghan and Son Ltd., *Stratford House, Stratford Place, London.*

A machine for forming pads or padding from fibres, comprises a fan, a duct leading away from the delivery of the fan, means for supplying the fibres to the fan for delivery as a stream through duct in the blast from the fan, and a vibratory tray, having upstanding sides and a vented cover, at the delivery end of the duct. The stream of fibres is delivered from the duct beneath the vented cover and the tray is arranged for vibration in such a manner that the fibres are formed into pads and are moved towards a delivery point by the vibrations of the tray.

861,483 Double Apron Drafting

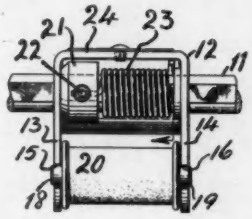
Joh. Jacob Rieter and Cie, *Winterthur, Switzerland.*

A double apron drawing arrangement for spinning machines comprises a lower apron reversing bar having a number of reversing edges and a differently shaped guide surface portion extending from each of the reversing edges for guiding a substantial portion of the upper run of the lower apron. The reversing bar and support means include co-operating means for selectively placing the reversing bar in a position in which a selected one of the guide surface portions guides a substantial part of the upper run according to the shape of the respective surface.

861,487 Apron-Tensioning Device

Tweedales and Smalley Ltd., *Castelton, Rochdale.*

Describes a device for tensioning the aprons of drafting apparatus. The device employs as its fixed support a stationary shaft 11 extending along the machine. The device comprises a bracket 12 which takes the form of a length of steel plate bent upon itself to form two spaced limbs 13 and 14, the extremities of which are provided with slots 15 and 16 to receive and provide bearings for the ends 18 and 19 of the arbor of the apron-tensioning roller 20. When the bracket 12 is in position the slots are directed downwards so that the tension of the apron 26 which is looped round the roller will



draw the roller upward and so retain it in its bearings. The relaxation of the apron tension will permit the roller to be dropped out of the slots and then removed from the loop of the apron. The limbs of bracket 12 are apertured at opposite points to receive the shaft 11, upon which the bracket 12 is freely pivotable. Mounted on shaft 11, beneath the limbs 13, 14 is a collar 21 having a grub-screw 22 by which it may be locked to the shaft. The collar forms an anchorage for one end of a helical spring 23 which is coiled about shaft 11. The other end of the spring 23 extends tangentially from the shaft and engages against the bridge portion of bracket 12. The spring is so tensioned that the force exerted as it tends to unwind operates to rotate bracket 12 about the shaft 11, and in such a direction that roller 20 tends to extend the loop of the apron 26, which is thereby subjected to the requisite tension. A guard plate 24 extends between the roller 20, and the collar 21 and spring 23 and serves as a cover plate.

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